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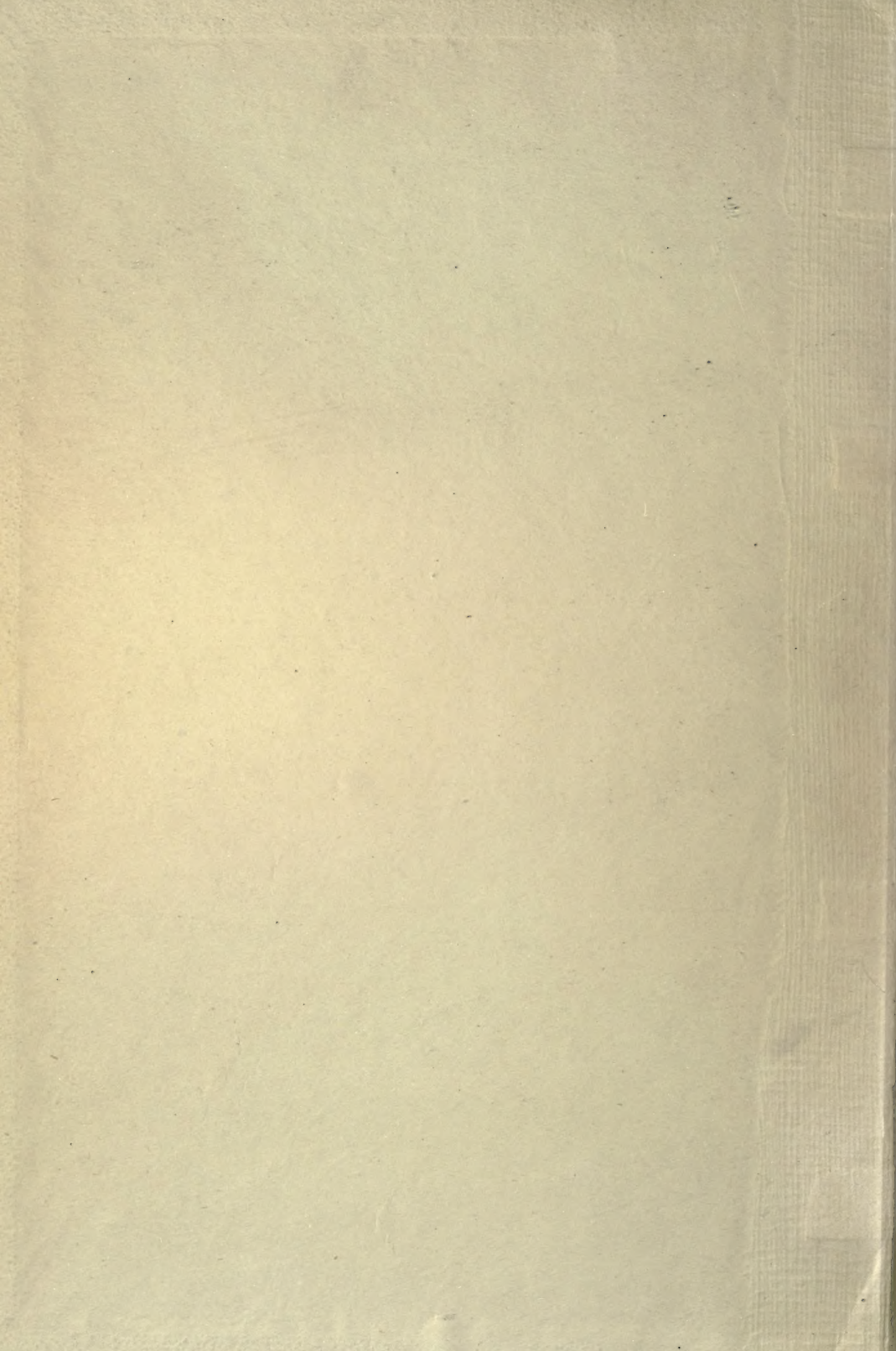
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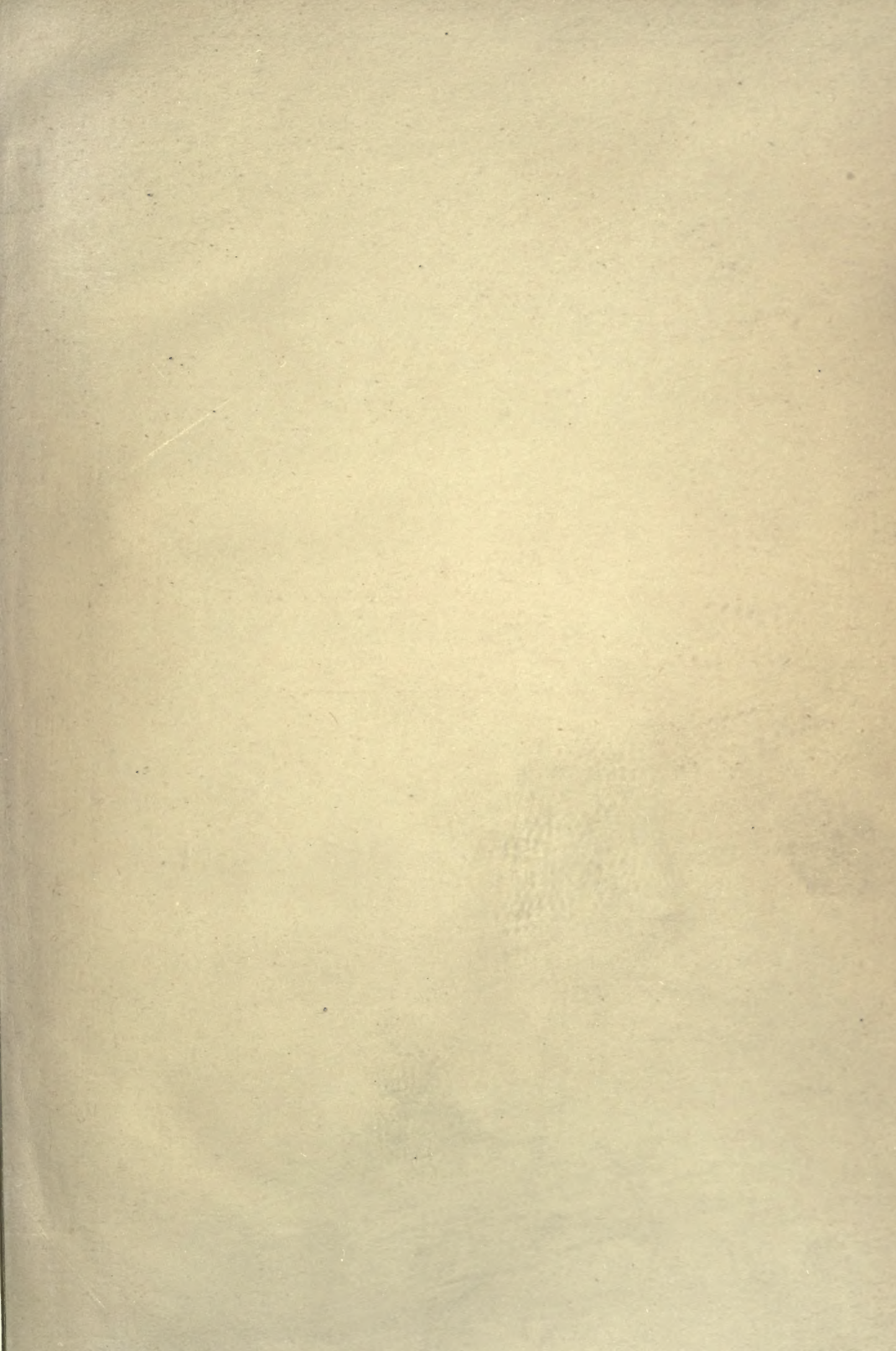
F. CALOT

*SECOND EDITION*












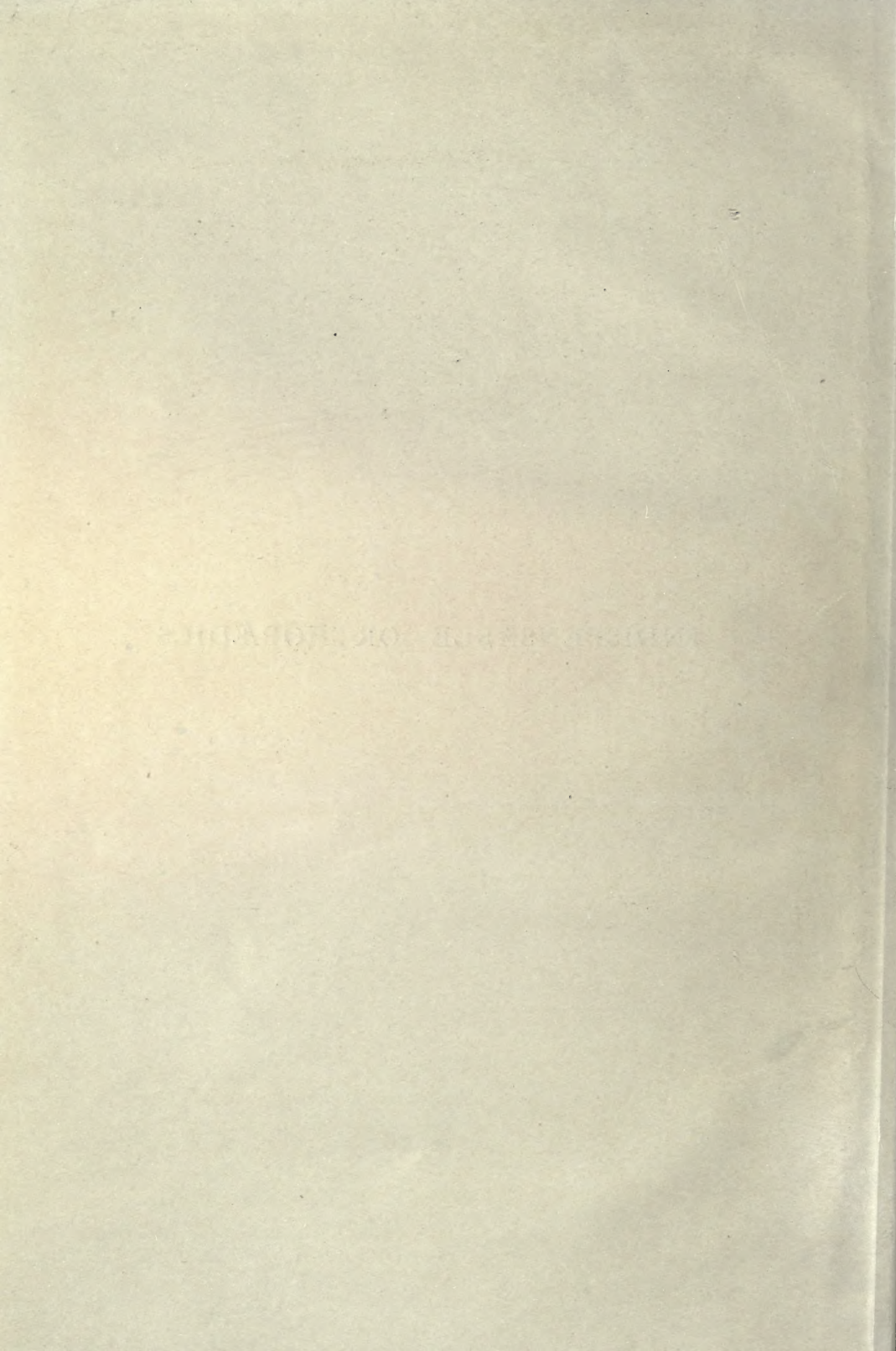


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INDISPENSABLE ORTHOPÆDICS







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# INDISPENSABLE ORTHOPÆDICS

A HANDBOOK OF TREATMENT

BY

F. CALOT

CHIEF SURGEON TO THE HÔPITAL ROTHSCHILD, HÔPITAL CAZIN  
HÔPITAL DU DÉPARTEMENT DE L'OISE, INSTITUT  
ORTHOPÉDIQUE DE BERCK, ETC.

SECOND ENGLISH EDITION

TRANSLATED FROM THE SEVENTH FRENCH EDITION

BY

A. H. ROBINSON, M.D., M.R.C.S.

WITH 1,140 ORIGINAL FIGURES AND 8 COLOURED PLATES

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## TRANSLATOR'S PREFACE TO THE SECOND ENGLISH EDITION

THE present edition represents the seventh French edition. It follows closely the previous English edition; but it has been carefully revised throughout by M. Calot and contains numerous alterations and emendations.

The number of editions through which the book has passed, and the several languages into which it has been translated afford ample proof of its value, not only to the general practitioner, for whom it was primarily intended, but also to many who are specially engaged in the field of Orthopædics. M. Calot has withdrawn from this edition his detailed account of Abbott's treatment of Scoliosis, which occupied some space in the previous one. It has been replaced by additional articles containing his estimate of the utility of Heliotherapy in the treatment of the external tuberculoses, and his later views on the subject of Coxa Vara in adolescents. The chapter upon the surgical treatment of Infantile Paralysis, which was previously supplied by another hand, he has here dealt with himself.

The present edition has been produced entirely in England, which has obviated altogether the many difficulties which were experienced in bringing out its predecessor; whilst an endeavour has been made to render the translation less obviously literal and consequently easier to read. It is hoped, therefore, that it will continue to prove of even greater service to its readers.

The translator takes this opportunity of acknowledging his indebtedness to his publishers for their invariable courtesy and consideration during the execution of his task of preparing the volume for publication.

A. H. ROBINSON.

HIGHGATE,  
March, 1921.





## PREFACE TO THE FIRST FRENCH EDITION

NEARLY every day practitioners are consulted about cases of hip disease, Pott's disease, white swelling, congenital dislocation of the hip, scoliosis, some rickety condition—in a word, about some deformity, congenital or acquired. But their knowledge of such conditions is so meagre that they hesitate undertaking the necessary treatment.

How is it that those practitioners who are quite familiar with the treatment of fractures and traumatic dislocations find themselves unable to undertake the treatment of orthopædic affections which are not, as a rule, more difficult to correct and follow up afterwards? It is because they have never learned the procedure. It is true that fifteen or twenty years ago, or even only ten years ago, there was no possibility of learning it, because the treatment of orthopædic affections was then too uncertain, if not even altogether non-existent.

Congenital dislocation of the hip, for instance, was at that time an incurable condition—the reproach of surgery. Hip disease and Pott's disease, when suppurated, invariably were fatal. Those three diseases, hopeless yesterday, can to-day be cured with certainty. And in the case of deformities generally, their treatment has so greatly improved that one can affirm without much exaggeration that, though most difficult to treat twelve or fifteen years ago, they yield to-day the most certain and lasting cures.

Not only can one cure them, one can do so by simple, harmless, and easily applied methods. The treatment no longer implies great surgical operations nor expensive and complicated mechanical apparatus.

In cases of hip disease and Pott's disease with suppuration, punctures only are required—punctures certainly more easy in the performance than the same procedure in the treatment of a pleural effusion.

In the case of congenital dislocation of the hip and similar deformities, correction is obtained by simple orthopædic manipulations, and it is preserved until cure is complete by the aid of a well-made "plaster." Surely this does not differ from the method employed in the treatment of traumatic dislocations.

Thus the treatment of orthopædic affections has become accessible to all practitioners—a beneficent revolution, bearing in its train very practical results; for hitherto three-quarters of such cases, unable to obtain the attention of the specialists at the large centres, were left untreated.

But let there be no misunderstanding. When I say that the practitioner can treat and cure these conditions, I refer only to the early period of their existence. Later on the possibility of cure is much lessened, and may be *nil*. For instance, I should never advise a practitioner to interfere with a case of congenital dislocation in a child of fifteen years; or with a case of hip disease, or one of spinal curvature of several years' standing. In those cases the treatment is exceedingly difficult, indeed almost hopeless, and they must always be reserved for the specialist. No; what the practitioner should do is to commence the treatment of those diseases at their very onset, and then the cure may be comparatively easy. In fact, is it not the family medical attendant who first sees such cases? He should learn to make use of this priceless advantage, to utilize the period when cure is relatively easy, though it lasts not merely for a few days—it may be several months, and, in some cases, several years.

But do not, on any account, allow the likelihood of such long duration to cause you to temporize. Why should you delay? When you are called to a traumatic dislocation or to a fracture do you not act at once?



If only practitioners who see these conditions in the first instance would at once commence the necessary treatment ! But how are they to know what that is ?

To provide the requisite information is the object of this book. I have endeavoured to be clear and concise, without, however, omitting any necessary and useful details. On every page figures illustrate the various stages of the treatment, described in such a way that any practitioner will be able to use any of the approved methods anywhere, and even without a special outfit and without a trained assistant.

I hope that, with the aid of this guide, all practitioners so desirous may be able to undertake and carry out successfully the treatment of orthopædic affections. If this be so, the time and labour expended upon this book will not have been wasted.

In conclusion, I wish here to thank my assistant, Dr. Fouchou-Lapeyrade, whose talent for drawing and deep knowledge of the subject has enabled me to illustrate it so admirably.

F. CALOT.

BERCK PLAGE,  
PAS-DE-CALAIS,  
1909.





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# INDISPENSABLE ORTHOPÆDICS

## CHAPTER I

For the successful treatment of orthopædic affections and of external tuberculoses, attention to the following points is of prime importance :—

1. *Early* diagnosis.
2. *Immediate* treatment.
3. *Perseverance* in treatment.
4. The preparation of *well-fitting* plasters.
5. In the correction of *tuberculous deformities*, *reduce traumatism* to a minimum.
6. Guard against operating in *tuberculous affections*; *never open* cold abscesses, but puncture and inject them.

### I

***Early diagnosis.***—Whenever a child is presented to you with a loss of power or a pain seated in any part of the skeleton, you should never neglect to **inspect and examine the child completely nude** (palpate, apply pressure, ascertain the extent of the movements of the joints).

### II

***Immediate treatment.***—The diagnosis being made, do not temporize; commence the treatment without delay, for the malady is progressive.

***Immediate treatment*** is nearly always synonymous with **easy treatment and perfect cure.**

### III

***Perseverance in treatment.*** — Continue the treatment without intermission to the end; the end may be protracted; it

may be **one or even several years**. Warn the parents of this and impress upon them that, just as in your own case, a strong dose of patience is necessary for them.

#### IV

*To make plasters which fit well.*—You should know how to adapt a plaster which will give a good support without being uncomfortable. This is as indispensable a matter in orthopædics as asepsis is in surgery. **It is as easy to make a good plaster as it is a bad one**, just as it is as easy for the practitioner to be aseptic as septic.

#### V

*Avoid every useless traumatism.*—In the correction of tuberculous deformities, one should proceed gently and rather by set stages. It is more necessary here than in other deformities in order to **prevent all danger of generalized tuberculosis**.

#### VI

*To guard against operating in tuberculous affections.*—*Never open a focus nor leave it to open.*—If the tuberculous focus has suppurated,—if an abscess has formed, a gland has broken down, an osteo-arthritis suppurated—**puncture and inject**.

If the focus has not suppurated, and is easily accessible (this is true for all external tuberculoses except Pott's disease), inject into the focus of such inactive lesion modifying fluids, to produce or to hasten the hardening or softening, after which you puncture as in the first case.

Remember that, in **tuberculosis**, operation rarely cures, it **often aggravates** and **always mutilates** ; whilst **punctures** and **injections** are a sure treatment, harmless and practicable.



1. In **orthopædics**,<sup>1</sup> those will have the **best results** who know **best** how to make **plaster apparatus**.

2. In the **external tuberculoses**, those will have the **best results** who know **best** how to make **punctures** and **injections**.

Hence the necessity of commencing by a careful study of the two techniques : of apparatus and of punctures.

And as a large number of deformities cannot be corrected without chloroform, we shall study in the third preliminary chapter, this very briefly, the administration of **anæsthetics**.

---

## THE PLASTER APPARATUS

Every practitioner should know how to make a **plaster apparatus**. It is as necessary—and even more often as necessary—as it is to know how to arrest a hemorrhage.

Without an apparatus it is impossible to treat a fracture, an arthritis, certain luxations or certain grave traumatisms, etc., etc.

This applies to all general practitioners.

But what shall we say as to apparatus, to those specially interested in orthopædics ? Without apparatus one can do nothing, or next to nothing. Without apparatus one can neither prevent nor arrest nor correct a deformity.

You can judge of the skill of the orthopædic surgeon by the apparatus he makes use of. “Show me your plaster apparatus and I will tell you what kind of orthopædist you are.”

---

<sup>1</sup> And one may add : in *fractures* and in most *affections of the skeleton*.

## THE PLASTER APPARATUS

**Plaster** apparatus are the **best**, and one may add that plaster **suffices for everything** and nothing can replace it.

Plasters are an object of **prime necessity**, and practitioners should never set out on their daily rounds without having a



Fig. 1.—Type of a plaster apparatus : this is the apparatus one applies for tibio-tarsal arthritis, and for fractures of the leg.

supply of a few kilos with them. (It is just as important as an artery forceps, a knife, a needle, sutures, a bottle of chloroform, a midwifery forceps.)

Only plaster will allow of securing different parts of the body



in whatever position is desired. For by its use we are able to maintain that position for the *few minutes* required for the setting process, but we cannot do this for the long hours which are required to dry any other substance than plaster, silicate of potash for instance.

Plaster, because it adapts itself as we wish it over any part of the body, will give us results very superior to all the splints in metal or in wood, including the Bonnet splint or the apparatus of Scultet, which are, besides, much more difficult to fashion than a good plaster.

In a word, with plaster, **every one of you** can manage to make on the spot, alone, without the aid of any mechanician or working orthopædist, **the best apparatus** possible (for fractures or injuries, or orthopædic affections).

And I can promise you that you will be able to make plasters *perfect, homogeneous, firm, accurate, comfortable and neat*, if you will follow very faithfully the directions which I am going to give in this chapter.

In the first part of the chapter (which you should read each time you make a plaster), we have put together all the indispensable points. In the second part (which you should read whenever you have the leisure), you will find all the supplementary details which you can desire of the technique of plaster apparatus.

## INDISPENSABLE POINTS TO OBSERVE IN THE PREPARATION OF A PLASTER

### SUMMARY

One should **prefer** even for the treatment of fracture, **circular plasters** which fit better, are more agreeable to the patient, and easier to make than splints.

In order to supervise the affected parts, in a circular apparatus, it is sufficient to make an opening over those parts, or to convert the plaster into a bivalve.

To ensure the **good nutrition** of the member under treatment, it is sufficient to be assured of the good nutrition of the extremities of the toes or of the fingers, which should always be left exposed beyond the apparatus.

A plaster is prepared with muslin strips impregnated with plaster paste and applied entirely round the region affected, which is previously covered with a casing of soft tissue.

One must therefore *procure*: first, a closely fitting casing; secondly, some muslin; thirdly, some plaster.

The **casing** is of some soft material: jersey, sock, stocking or sleeve of a jersey—according to the region.

This casing is always thinner and more even than cotton wool. It is only in default of such a casing that one would use cotton wool, taking great care to apply it in a layer as even and as thin as possible (of a thickness of not more than 1 or 2 mm.).

The **plaster bandages** are strips of muslin about 5 metres long and 15 cm. wide, which have been impregnated with plaster:

(a) Either they are **steeped at the time in plaster paste** made with 5 parts of plaster and 3 parts of water, **cold, without salt**.

(b) Or sprinkled a little beforehand (one or a few hours before) with dry plaster in the proportion of 60 grammes of plaster for each metre of bandage; these strips are then soaked in cold water a few minutes before being used.

To prepare a firm apparatus it is well to insert a support of "attelles," or strengthening pieces, between the layers of the bandage. These attelles are simply pieces of muslin cut beforehand and soaked for a minute or two, before being used, in the same cream as the strips.

These "attelles" (there are two of them) have a length equal to that of the apparatus, a breadth equal to half the greatest circumference of the apparatus, and a thickness of one, two, or even three sheets of muslin, according as the plaster is a small or a large one, and as it is for a child or an adult.

If it is a plaster for the arm, which ought to include the shoulder girdle, or a plaster for the lower extremity, which should include the pelvis, a third attelle is introduced in the form of a belt, overlapping the upper margin of the two others.

### The preparation of the plaster apparatus

Suppose you wish to make a **plaster** for the leg.

The leg, being covered with a casing, is placed in position, an assistant holding it and raising it by the foot. You apply the first plaster strip, beginning at the toes and the foot, in circular turns overlapping one third, without making reverses, which are unnecessary. Take care to **apply the strip**: (a) **exactly**; (b) **without pressure**; (c) **flattening it well** so as not to leave creases. You ascend as far as the upper extremity of the apparatus, where you cut short the strip if it is not used up.

Over this first layer of turns of strips, **attelles** well smoothed down are applied, one in front, another behind. And over the attelles you apply further turns of strips, making thus a third or fourth covering, according as the case is a child or an adult.



Between the different layers of the apparatus and over the last one, some **plaster paste**, one to two centimetres in thickness, is applied. And that is all.

Then, **verify** and rectify, if necessary, the **position** of the limb; **model** the plaster over the osseous prominences of the part by pressing, not immediately *upon*, but *around* those prominences; **maintain** it thus until the *complete setting* of the plaster.

A quarter of an hour later, **trim** the plaster, strengthen it if need be. **Before leaving the house, always make sure** of the good **nutrition** of the toes, which will be a guarantee of the good nutrition of the entire limb.

We will take as a type of our description the construction of a **plaster for the leg**, beginning from the toes and reaching as far as the lower third of the thigh.

It is the apparatus which should be used for fractures of the leg and for arthritis of the ankle.

It should reach to a point above the **knee-joint** because, to immobilize well a portion of a limb, it is necessary always to immobilize at the same time as the segment involved, at least the two adjacent articulations.

We will now give, *à propos* of this apparatus, that part of the **preparation** which is **common** to all plaster apparatus, whatever their purpose. As to the special needs of each region, you will find them indicated in the chapters devoted to the different diseases (for the plaster corset, see the chapter on Pott's disease, and for the large plaster for the lower limb, the chapter on hip disease).

#### A.—THE MATERIALS NECESSARY

Three things: (a) a **casings** of soft tissue; (b) some **plaster**; (c) some **muslin**.

(a) The protecting **case**.<sup>1</sup>—You will find this very easily; it should be simply a large stocking reaching up to the lower

<sup>1</sup> Much preferable to cotton wool, as we will show later.

third of the thigh, or, better, two sleeves of a jersey applied end to end, or even a "tube" of soft tissue.

If the tissue of the "tube" or casing is very thin you employ two, one over the other.



Fig. 2.—The casing of soft tissue (jersey or "tube") which protects the skin from direct contact with the plaster.

If the tube be too large, make it fit at once by means of sewing.

(b) **The Plaster.**—This is white plaster of Paris, fine and homogeneous, soft to the touch as starch powder.

Preserve it from moisture, and even from the air, in a glass jar, or in a tin box, hermetically closed; because the plaster deteriorates, that is to say, it becomes moist in time, if kept in a bag, even in a place which does not appear to be damp.

If you take two samples of **good** plaster obtained from different sources, they may not both set in the same time; this depends upon their degree of baking. The moment of setting may vary very markedly in the one sample and the other; and



it is to prevent disappointment that I advise you always **to test** the sample of plaster you are using, before preparing your apparatus.

In order to do this, place in a bowl five spoonsful of plaster to three of water (these are the ordinary proportions), mix them well together and note how long this "plaster cream" takes to set.

If you cannot obtain the **white** plaster of Paris, you may use the **grey** (as used by plasterers), coarser, often as gritty as sea sand. To ensure against risk of its not being perfectly dry, take it from the middle of the sack and sift it, if it is not homogeneous. This common plaster should be made of a thicker consistence than the white plaster; you must put a third more plaster to the same quantity of water—remembering that it requires a third more time to set than the white plaster of Paris. You can make good apparatus with this common plaster, though less pleasing, provided it has not deteriorated.

Finally, suppose in a case of extreme urgency, you have only at hand plaster which is a little deteriorated, that is to say, hydrated (white or grey plaster); you could dehydrate it and restore its efficacy by baking it for ten or fifteen minutes, in an ordinary oven and in an open receptacle,<sup>1</sup> until no more water vapour is disengaged.

**The quantity of plaster required.**—Take rather too much; say 2 kilos for a child of ten or twelve years of age, and three for an adult (for a leg apparatus).

(c) **Muslin.**—Ask at the stores for stiff muslin, No. 7 or 8, that is, with 7 or 8 threads to the square centimetre (see fig. 3).

<sup>1</sup> Where can we procure good plaster? This practical question is often asked by practitioners. Well, you may obtain the white plaster of Paris at pharmacists, and at *some* moulders; I dare not say at *all*, because some use in place of plaster, alabaster, which does not fulfil exactly the conditions required.

This No. 8 will not be too close nor too open; it is the kind of muslin used by dressmakers for making the patterns for dresses.

Procure more than you really want.

Take 7 or 8 metres of the ordinary width, which is 60 or 70 cm.; 5 metres will be sufficient for a child of 10 or 12 years.

Failing stiff muslin, should the case be urgent, you will

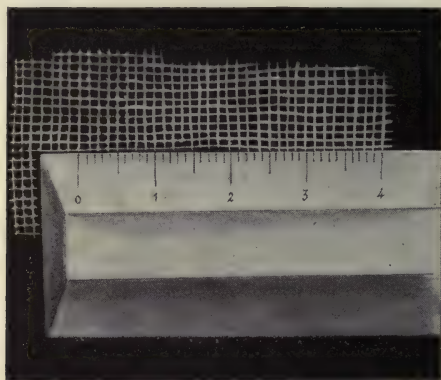


Fig. 3.—The stiff muslin No. 8 used in making the strips and the attelles.  
(8 threads per centimetre.)

find plenty of old curtains, or cast-off sheets, from which you can cut off strips of 12 cm. in width, and you can join them together end to end with fine stitching, so as not to leave any ridges.

Lastly, you should have two or three basins, **some cold fresh water**, scissors, and a knife.

And ask also for one or two large sheets, which you can arrange so as to prevent the spotting and soiling of the carpet, the bed, or the floor, with plaster.

## B.—ASSISTANTS

You should have two assistants (one will be sufficient at a push), to make the apparatus for the leg.

The assistants need not be medical men, but simply two members of the family ; you should make them understand how to follow well your instructions and assist your movements.

With these assistants, you should **commence** by **cutting** your **strips** and **attelles** out of the large piece of muslin.

## C.—PREPARATION OF THE STRIPS AND ATTELLES

(a) **The strips.** You separate, by tearing with your fingers, a strip of muslin having the following dimensions :—

**Breadth :** 12 to 15 centimetres.

**Length :** 5 metres.

These are the **ordinary dimensions** of the plastered strips.

Then you take a second and a third strip from the roll of muslin.

The **number** of the strips naturally varies with the build of the subject ; for a child under 7 or 8 years, one strip may be sufficient ; for a child from 8 to 14 years, two strips ; for an adult, three strips (always for a leg apparatus).

(b) **The attelles.**—These are not indispensable ; the apparatus could be made with strips alone but it is better to incorporate attelles or strengthening pieces between the layers of the strips. With these “ **attelles** ” the apparatus are **firmer, more easily** constructed, **more quickly** made, **more compact**, more homogeneous, than those made with strips alone, especially if one employs strips which have been sprinkled with plaster beforehand.

The attelles are cut from the remains of the piece of muslin (after having taken the strips from it).

The **number** of attelles : two for each leg apparatus.



The **Dimensions** : the same for the two attelles, namely :

**Length**, equal to that which the apparatus should have (measuring from the upper limit above the knee, to the heel, and adding the length of the sole of the foot).

**Breadth**, equal to half the greatest circumference of the region to be covered (that is to say, here, half the circumference of the calf).

**Thickness**, that of two sheets of muslin. It is unnecessary to sew the two sheets together ; folded one on the other and flattened with the hand, they will remain in contact.

Here, then, are your strips and attelles cut out of the piece of muslin. But you will not plaster them until you have prepared the affected limb and placed it in position.

#### D.—PREPARATION OF THE PATIENT

The patient remains in bed, or, better, is carried **on to a table**.

The two legs are brought over the edge of the table. The sound leg need not be held ; the sound foot rests on a chair.

**The Toilet of the Skin.**—The skin is washed with a swab damped with alcohol or ether, and is lightly sprinkled with sterilized talc. If there is a wound, one covers it with a square of aseptic gauze, taking note of the place, to make there an opening in the plaster a few minutes after its construction—in view of the dressing required afterwards.

##### (a) **Placing the limb in Position.**

Two cases :

Either the limb is already in **good position**, or it may be placed so at once (arthritis without deformity, fractures without displacement, or where reduction is very easy).

Or else the limb is in **bad position** and its correction requires some time, and often even the use of chloroform (fractures or refractory orthopædic deformities).

As for the manipulations required for correction, this is not the place to describe them; they will be indicated *à propos* of each deformity.

When the correction has been made, it will be maintained by an assistant at the bottom of the table, who will seize the foot and pull on it more or less, as the case requires.

If a very steady, strong traction is needed a second assistant may make counter extension by holding the thigh or the knee with both hands and pulling in the opposite direction.

**Manner of holding the foot.**—The right hand of the assistant grasps the fore part of the foot firmly, the palm of the hand being applied to the sole, and the fingers on the dorsal aspect. The left hand seizes the heel and the instep, the palm embracing the projecting heel, the fingers on the lateral aspect.

**Position of the foot.**—1st. It should be held at 90° of **flexion** upon the leg, or even at a slightly acute angle, of 80° for instance; 2nd. The middle line of the **second toe** must correspond with the **crest of the tibia**. Sometimes in order to obtain a hyper-correction the foot is carried a little to the inner side, or a little to the outer, in an inverse direction to the deformity it is desired to overcome; 3rd. The heel should be made to present its normal projection behind (compare it with the sound side).

**(b) Enclosing the limb in a casing of soft tissue.**

To prevent any discomfort to the patient while the casing is passed on the foot, the assistant holds the heel with one or both hands, and pulls towards him while it is passed over the toes, gathered up and folded (see fig. 4); then the casing having passed as far as the base of the toes, the assistant leaves the heel and takes hold of the toes and instep with



Fig. 4.—One passes the casing or “tube” as one puts on a new stocking, folding it back. Whilst an assistant holds the foot by the heel, one commences by covering the instep with this folded “tube.”



Fig. 5.—The tube once passed over the foot, the assistant leaves the heel and seizes the instep, then again the heel. The casing is unfolded to ensheath successively the leg, the knee and the lower part of the thigh.



both hands, while the casing is passed over the heel and on to the leg (see fig. 5). The casing being in place, the assistant takes hold again of the heel and instep.

The upper border of the casing is held by a second assistant **seated**, or by the patient himself.



Fig. 6.—Placing the patient in position.

If instead of a tube, a stocking is used, its lower end should be cut off to allow of inspection of the naked toes.

#### E.—THE PLASTERING OF THE MUSLIN BANDAGES AND "ATTELLES"

This is done by simply steeping the strips and attelles in the Plaster cream.<sup>1</sup>

(a) Composition of the **Plaster cream**.

Plaster is mixed with water in the following proportions :

<sup>1</sup> Cover your hands with vaseline before doing this.

five cups of plaster to three of cold water, without salt ; therefore, **no hot water nor salt**, with which the plaster sets **too quickly** ; with those also the **apparatus** is **too brittle** and **friable**.

The quantity of the cream to be prepared for an apparatus for the leg is one cup and a half of water to two and a half cups of plaster for a child ; three cups of water and five cups of plaster for an adult. This quantity suffices amply for an ordinary apparatus for the leg.

If, by any chance, you run short of the plaster cream in the course of constructing the apparatus, you may prepare more at once in another basin, or, if you like, in the same one, but after having thoroughly cleansed it, for the new cream must not be mixed with the debris remaining from the preceding mixture.<sup>1</sup>

How ought one to proceed in preparing the **Plaster cream** ? Into a hand basin, first pour all the water required, then all the plaster needed. Stir up **at once, rapidly** and **thoroughly**, so as to make a homogeneous cream, without leaving any grit. This mixing of the plaster requires hardly 15 to 20 seconds.

#### (b) **Impregnation of the bandages** (see fig. 7).

Immediately the cream is ready you unroll the strip or strips of muslin and pass them through it, which allows of their being impregnated "uniformly" and quickly with plaster.

The first strip being impregnated, you quickly roll it up,

<sup>1</sup> Mix the two pastes ? never ! nor will you ever add water to a cream which is too thick, and has been mixed several minutes ; this would "drown" and "kill" the plaster ; one would only have "dead" plaster (to use the technical term). One would "turn" the cream.

To add plaster to a cream too thin is not so bad as to add water to a cream which is too thick, nevertheless both are undesirable and should be avoided.

When you find, after a few minutes, that you have not sufficient cream, **you will make a new supply**, in a perfectly clean basin. In the same way, if it ever happens **after a few minutes**, that you find your cream is too thin, or too thick, throw it away, wash out the basin and make a new supply, which should be more or less charged with plaster as may be required.

and the others will be rolled up in the same way by your assistants, who have seen how to do it. You pull on each turn with



Fig. 7.—The method of preparing the best plastered strips. The strip of muslin is rolled in the plaster cream (three cups of water to five of plaster).

the traction you use in applying a bandage of linen, or of linen soaked in silicate of potash, which all of you have learned

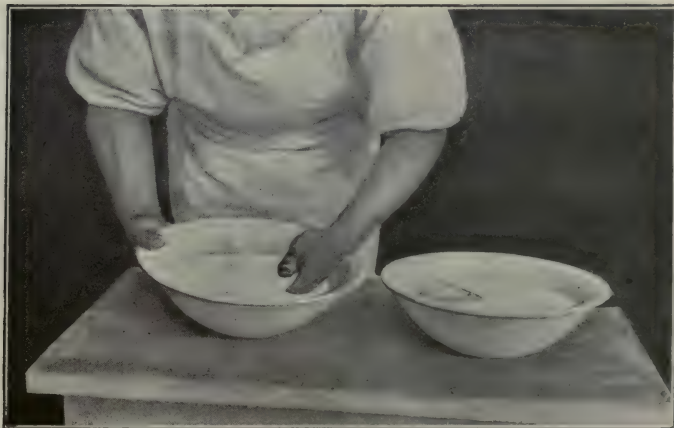


Fig. 8.—In the basin on the right, a bandage has been rolled in the cream; in that on the left, the plaster intended for the preparation of attelles is being stirred.



to do. In a word, do not tighten too much, nor too little ; and the strips will thus retain just the quantity of plaster you wish, and you will be able to apply them one after the other without having to squeeze them, or, at any rate, very little.

The rolled strips are left in the basin while you go on plastering the attelles (fig. 8).

(c) **Impregnation of the Attelles** (see fig. 9).

In a second basin, in which you have prepared a fresh supply



Fig. 9.—Method of soaking the attelles in the cream : they should be impregnated a little at a time, and not all at once and *en masse*.

of cream, or have poured the excess of that prepared for the strips, but which you have not used, you soak the attelles, **one by one, folding** and thoroughly impregnating them.

The impregnation of the attelles requires scarcely a few seconds (say, 15 to 20 seconds).

As soon as the strips and attelles are impregnated, they should be applied. But, before indicating the method of making this application, we ought to explain a second method of preparing the plaster strips which is found recommended everywhere : the sprinkling of the strips with plaster, beforehand.

### Plaster strips, prepared beforehand.

This procedure consists in *impregnating beforehand* the muslin strips with *dry plaster*, placing them afterwards in reserve, several days or several weeks, until they are wanted; it is then sufficient to dip them in water a few minutes before applying them.

Yes, but remember it is **difficult enough** for those not accustomed to



Fig. 10. —To prepare plastered strips beforehand, one sprinkles 60 to 70 grammes of plaster in powder over each metre of muslin (15 cm. wide); one rolls the strip with the right hand whilst the left hand spreads the plaster.

it, to prepare in this way bandages having the **desired charge of plaster.**

If there be too much plaster, it will not allow of being well "soaked," and will retain in places gritty particles of hard plaster; when there is not sufficient plaster, the apparatus will be soft and friable, like a puff-pastry. More than that, the plastered strips prepared more or less a long time beforehand,

run the risk of decomposing, that is to say, of deteriorating and becoming hydrated.

And this is the reason why I advise you, in a general way, to prepare your strips in the manner first described (in the cream), which is moreover the simplest and surest method of obtaining homogeneous and firm apparatus.

Notwithstanding, I do not absolutely prohibit your having recourse to the second method; there is one case even where it would be better to use it. It may be that, having need of a large number of strips in order to make a large apparatus for Pott's disease or coxitis, you have not at your side three or four capable assistants, who after having seen you plaster the first bandage



Fig. 11.—The sprinkled strip is dipped into a basin of water; some bubbles of gas are at once disengaged: and when no more gas comes off, it is ready for use; take it out, press it, and apply it.

*in the cream*, will plaster all the others, **whilst** you yourself apply the bandages.

If you are alone in making such large plasters, or if you have only one assistant, you run the risk of being much retarded by this preliminary preparation of all the plastered strips required, and of finding, after having plastered the last, that the first one in the basin is already hard and unusable.

So that, **in this particular case**, I recommend you to use **bandages already powdered**.

To produce good ones, you will take the following **two precautions** :—

1. The strips will be plastered to the proper degree—neither too much nor



too little—by incorporating **60 to 70 grammes of plaster to each metre** of muslin (15 cm. in width): altogether, 300 grammes of plaster to the entire bandage of five metres.

Thus, you will divide your pile of 300 grammes into five small heaps and use one of the small heaps with each metre of strip. The sprinkling of the strip is very easy: you do just as you would in preparing a whiting for frying.

2. So as not to leave the strips to decompose, preserve them in a **tightly closed** receptacle until you use them, or, better still, do not sprinkle them until a little while ( $\frac{1}{4}$  to  $\frac{1}{2}$  **an hour**) **before** you prepare your apparatus.



Fig. 12.—The best method of holding and squeezing the wet plastered strip.

When you wish to construct the apparatus, dip two of these strips into a basin of water, so that each of them is entirely immersed (see fig. 11); leave them soaking until you no longer see bubbles of air on the surface of the water (about 2 or 3 minutes): at that moment, take the first strip, squeeze it thoroughly and wring it, holding it by the two ends (see fig. 12) and set about applying it.

As the strips should not be left too long in the water, because they would harden and become useless, care must be taken that, where a large number of strips are being used—as is obviously the case in making a plaster corset for an adult—they are not all put in the water to soak at the same time, but dipped

in successively, at intervals as nearly as possible equal to the time taken in applying one strip to the patient.

Then, the first strip having been applied, and before removing the second from the basin, you place a third to soak ; before applying the third you dip a fourth, and so on.

As to the **plastering** of the attelles (when the strips have been prepared by the second method of previously sprinkling) it should always be done in the manner described above, soaking the attelles in the cream.

#### F.—APPLICATION OF THE PLASTERED STRIPS AND ATTELLES

Immediately they have been plastered, as we have said, the strips and attelles should be applied **without any delay**,



Fig. 13.—First strip : begin at the extremity of the foot, at the base of the toes. Apply without tightening ; spread out the strip.

for the cream prepared in the proportions indicated above (5 parts of plaster to 3 of water) begins to “set” in about ten minutes.

The strips and attelles must therefore be applied in **less than ten minutes** in order to have, at the very least, two or three minutes before the setting of the plaster, in which to correct the position of the limb and effect any "modelling."

But let me assure you that you will always find it easy, in the case of a leg apparatus, to be in time. You will have to allow pretty nearly for each stage: (a) for applying the strips, one to two and a half minutes at the most; (b) for applying the attelles, about as much. Altogether, five or six minutes at the most: there are then fully five minutes more (which is more than you need) to correct the position and effect the modelling.<sup>1</sup>

#### (a) The application of the strips.

Take a plastered strip—without squeezing it, or scarcely at all—and apply it by commencing at the extremity of the toes.

**Mode of application of the strips.**—One makes circular turns which overlap a half or third, but one never "reverses." That is not necessary with bandages which are soft and moist: **they mould themselves** to the contours of the limb and fold themselves slightly where it is necessary—without making folds causing sores, for they are very small and even smaller than those you would make with reverses.

The circular turns overlapping one another thus cover the foot, the instep, the leg, the knee, and ascend up to the lower third of the thigh.

The topmost turn of the plastered strip should cease 1 cm. below the upper border of the jersey.

**Three recommendations** as to the manner of applying the strip; **spread** it out, apply it **exactly**, but **without traction**.

<sup>1</sup> But if it is very easy to finish in good time in preparing a leg apparatus, it is much less easy to do so in preparing a large apparatus, for Pott's disease, or even for coxitis, when one is "out of practice." Consequently for these large apparatus you should prepare a thinner cream (to 5 parts of plaster put 4 parts of water instead of three), that will give you five minutes more margin, that is to say, the setting of this cream will take about fifteen minutes. But we will return to this, *à propos* of the plaster corset.





Fig. 14.—*How not to do it.* Do not let the bandage make creases over the instep as it is doing here.



Fig. 15.—The creases which the strip may make are effaced by the left hand as soon as they are made.

1. **The spreading out** : avoid making twists, but without being in the meantime concerned about the inevitable (and negligible) small folds occurring in the strip rolled round a region not regularly cylindrical (fig. 14). Rather than make a "twist" cut your strip and spread out the ends. If care be



Fig. 16.—*What you should avoid.* Do not pull on the strip, for by doing so the limb is constricted, as is shown here.

taken in this way to spread out the strip the apparatus will not cause any sore.

2. To apply the plastered strip **exactly**, follow carefully the contours of the region. You can flatten out with the left hand, as you go on, each turn applied by the right hand (see fig. 15). And in this way you will have a well-fitting apparatus, neither loose nor irregular.

3. **Do not tighten** the strip (a mistake often made by beginners). Avoid causing cedema of the limb (see fig. 16) : make

no traction, no pressure. Take care not to pull on the strip, as you would on an Esmarch's bandage. Apply the strip as if you had to take an impression of the contour and the volume of the limb, without adding or curtailing anything, and in this way you will have plasters which will cause no discomfort.

The first covering having been finished, when with the bandage you have arrived at the upper border of the apparatus, if the strip is not used up, you will tear it with your hands, or better, cut it with scissors, and keep the remainder to apply later on over the attelles.

(b) **The application of the Attelles.**—Over the first covering made with the strips, the two attelles are applied (fig. 17, 18 and 19). You take one of them, it does not matter which (they are equal); squeeze it slightly; spread it out and apply the **first one behind**. Spread out one of its extremities, first under the toes where the assistant takes hold of it and keeps it in position, then along the sole and upwards under the heel, which it encloses afterwards, over the whole of the posterior part of the limb, under the back of the knee as far as the upper border of the apparatus where its extremity is held by some one, or by the patient himself.<sup>1</sup>

The other attelle—**anterior attelle**—is applied in front, beginning also at the toes.<sup>2</sup>

You carry out the application of the attelles, at the same time spreading out and smoothing down their edges in such a

<sup>1</sup> If you wish to protect the toes from the pressure of the bedclothes you may allow the lower end of the attelles to project two or three centimetres beyond them. If by doing so your attelle is too short at the upper part, it is of no consequence: you will only have to strengthen, by some supplementary strips, this part of the apparatus, where the attelle is wanting.

<sup>2</sup> But without going further, without going even as far as their extremity, one leaves bare the last joint, in such a way as to allow of constant inspection of the skin. You could take no notice of this recommendation during the construction of the plaster, but cover, without hesitation, the dorsal aspect of the toes, provided that you liberate them when you trim the plaster.





Fig. 17.—Posterior attelle : begin its application under the sole of the foot.



Fig. 18.—The application of the posterior attelle (continued). While the assistant keeps in place the plantar portion, you spread out the middle portion under the calf.

manner as to avoid any sharp projection, which is very easy with attelles so thin as these (made, as I said, with one or two sheets of muslin).

The edges of the attelles will overlap each other opposite the thinner parts of the limb, which is an advantage.

To facilitate and perfect their imbrication you may incise



Fig. 19.—The posterior attelle applied. It encloses half the circumference of the posterior aspect of the limb, after the fashion of a casing.

the edges with a cut of the scissors at the level of the malleoli and the heel.

**Over the attelles** a covering is made with plastered strips : one uses one or two strips (according as one is dealing with a child or an adult). The strips are rolled from toe to thigh, and then from thigh to toe—until the strips are used up.

#### **An important detail.**

Between the different layers of the apparatus you spread with your hand a layer one or two millimetres thick of plaster

cream : you use, for that purpose, what remains of the cream after the plastering of the strips and attelles ; or if none of it remain, you at once prepare a new supply.

This layer of plaster cream is the **cement**<sup>1</sup> which binds into a single homogeneous block the different parts of the apparatus.

Then, over the last strip, spread a final layer of cream, to give a finishing touch<sup>2</sup> to the apparatus.

It is now complete.

The application of the strips and attelles should occupy from three to four minutes, not more than five.

You will then have,<sup>3</sup> *before the setting* of the plaster, several minutes which are necessary for correcting the position and moulding the apparatus.

"Several minutes," that is the desired margin ; not too much nor too little. You should have everything calculated so that this may be so ; that is to say, you should not only have tested your plaster beforehand, but more than that, if you are a novice you should have made a rehearsal and constructed a plaster on the same plan upon a living model.

But may it not be possible, when you have not decided on your plan and taken the necessary precautions, to advance or retard slightly the setting of the plaster ?

To **hasten** the setting it is recommended in some books, to dry the surface of the apparatus with hot napkins, or with several turns of dry linen bandages which you take off in a little while, or to powder the damp surface of the apparatus with a layer of one to two millimetres of dry plaster, or, better still, to lay on both aspects of the apparatus two pieces of dry muslin.

<sup>1</sup> Without this cement one runs the risk of having the plaster not homogeneous (a "gâteau feuilleté"), especially if it has been prepared with strips dusted beforehand with plaster.

<sup>2</sup> We will explain further on, p. 73, the method of polishing the apparatus.

<sup>3</sup> See p. 23.



But I advise you to do nothing of the kind, and not to use any of these means, which spoil the plaster; use simply . . . a little patience: and so, the setting not having been "forced," the plaster should be firmer, more homogeneous and more presentable.

As to the methods of **retarding** the setting, all those which



Fig. 20.—The anterior attelle is next placed in position.

have been proposed are uncertain or even objectionable; they aggravate matters instead of improving them and tend to "spoil" the plaster.

No; if the plaster appears disposed to dry a little too quickly, the only thing to be done is to out-do it in quickness and to roll the last layer of bandage so as to hasten the modelling.<sup>1</sup>

<sup>1</sup> Once again, you will avoid all these annoyances by testing your plaster beforehand. And if, in spite of everything, you fail in your apparatus, if, for example, you find the first layer set before having applied the last strip, well!

# G.—VERIFICATION OF POSITION AND MODELLING

(a) **Verification of Position.**—Verify and rectify, if need be, the position in which the assistant holds the foot; and even take his place in this delicate rôle if you are not sure of him, and put him in yours to perform the modelling, which is assuredly more easy than keeping in good position the foot and the leg.

If you have to pull on the leg, change now and then the position of your hands so as not to exercise a continuous pres-



Fig. 21.—Modelling of the apparatus around the patella and heel.

sure on any one point, which might cause an abnormal projection of the plaster inwards at this point.

(b) **Modelling the Plaster.**—The plaster is modelled by pressing it around the osseous prominences (*not upon* you will at once have to take off the apparatus—which is easy—and begin again. That has happened to us many times, and we do not consider it any discredit. You have always the expedient, to save your reputation, of attributing the premature setting to an over-baking of the plaster.

them, which might produce sloughing, but *around*) in such a way as to accommodate the prominences in depressions of the plaster. Here, at the knee, the modelling is done by embracing the part with both hands, like two spherical covers; the plaster should mould itself over the patella and the condyles. Press it into the grooves which lie between the patella and the condyles.

In pressing it one obliterates the bridges which it makes at



Fig. 22.—When the plaster is *set* you raise the heel so that the air passing beneath the apparatus assists the drying (do not confound the *setting* of the plaster, which requires several minutes, with the *drying*, which requires several hours and even sometimes several days).

these points; one prevents in this way the knee and the leg twisting in the apparatus.

In a word, one utilises all the prominent parts (condyles, patella, tuberosities of the tibia) of the knee joint, which form so many keys between the leg and the plaster envelope. That is to say, one models the plaster in this way above and below the knee, around the femoral condyles and the tibial tuberosities. One is able, also, to slightly model the malleoli and the



arch of the foot, but this is practically useless : in any case, the modelling will be easily effected with the two hands which grasp the foot and the malleolar region. You should **preserve the correction and the modelling right up to the setting of the plaster, simultaneously** ; it is sometimes rather trying, but it is absolutely indispensable, if you wish to lose none of the correction obtained. One recognises that the **plaster is set** by its no longer creasing on the surface ; by it emitting a sound under the finger, when tapped ; by it being warm, remembering however that when it has been prepared with cold water, it will not always be warm to an appreciable extent, even when the plaster is good. When the plaster is set, and then only, you may release the patient's foot and place it on the table, or, better still, on the back of a chair, to hasten the drying.

#### TRIMMING THE PLASTER

Ten or fifteen minutes after the plaster is set, you may commence trimming it with a good knife, cutting gently and slowly into the apparatus, which at this moment, permits of being cut like soft cardboard ; you cut off the part which covers the extremities of the toes, in such a way, as to expose the dorsal aspect of the last phalanx. One takes care not to cut into the jersey or stocking, in order to preserve a surplus of the covering which will prevent friction of the plaster over the bare skin. One frees, in the same way, the upper part of the apparatus, preserving, here again, 2 or 3 cm. of the soft casing beyond the border of the plaster.

Thanks to this trimming of the lower extremity of the plaster, one is able to make an easy and continuous *inspection* of the nutrition of the toes. (If all be well with them, one is assured of the good nutrition of the foot and leg.)

The toes ought to be sensitive to the prick of a pin, rosy, warm, and supple.

You must always look at them before leaving the house, and it will be sufficient afterwards if some one of the family watches them every hour for the first day, then morning and evening on the following days, drawing a pin over the surface of the toes.<sup>1</sup>



Fig. 23.—Trimming the plaster by means of a knife or bistoury.

If the patient is unable to *move them voluntarily* you should open the plaster by a median slit from top to bottom, until they do move.

You split the plaster first in the middle of the dorsal aspect of the foot, afterwards on the anterior aspect of the instep, and with a spatula, or even with the hands, you widen, for one or two centimetres, the still soft edges of the plaster,

<sup>1</sup> Any one may easily perceive the least troubles or anomalies of this kind ; it will be sufficient to compare the results of examination of the affected side with that of the sound side ; moreover, in case of doubt, the attendant should advise you immediately, and in this way, if any trouble whatever should arise, even unexpectedly, during the following days, you would always be able to remedy it in time.

stopping the instant that the normal sensibility and colour of the toes return.

If these do not return, you widen more and split the plaster, further and further upwards, if need be up to the upper



Fig. 24.—The apparatus complete, trimmed and polished.

border, and raise the edges. Then, everything should return to the normal.

You have only then to fix the plaster at this degree of widening with a plastered strip, or simply a muslin bandage. In short, provided that you never depart from this **absolute rule of never leaving your patient without having positively ascertained that the toes (or the fingers) are rosy, warm**



and **sensitive**, I can guarantee that you will **never have serious trouble** with the nutrition after the application of a plaster, be it the lower limb or the upper limb.

After the trimming, the patient is carried to bed.

### **The method of lifting and conveying a plastered subject, without injuring the apparatus**

Take hold of the leg in such a manner as not to make any movement contrary to the position given, or which tends to call into play the articulations fixed by the apparatus. One leaves the plastered leg exposed, the heel raised, so that the drying of the plaster may proceed as well underneath as above (see fig. 22).

Do not confuse this drying with the setting; the latter does not require more than ten minutes, while the former requires one or two days, sometimes more; during that time, one should guard against moving the patient, for the plaster, so long as the least moisture remains, is likely to break; however, if it were to break, it would be quite easy to repair it; we will describe how in a moment.

### **Attentions to be paid after application of the plaster**

The plaster being constructed, your immediate labours are ended. The patient being returned to bed, a hot-water bottle may be placed on each side of the plaster to hasten its drying. The toes must be protected against the pressure of the bedclothes, thus facilitating the circulation of air round the apparatus, and helping the drying. It is well for this purpose, to leave the plastered region outside the bedclothes, for the first twenty-four hours.

A plaster ought not to cause any more discomfort than a well-made boot.

At the most, the patient may complain of a sensation of

uneasiness, similar to that caused by a new boot. If you call on your patient a few hours afterwards, or the next day, he will tell you perhaps that he feels some uneasiness at the edges of the apparatus ; the two outer toes, the great and the small, may be a little pressed upon by the plaster. In that case, introduce a spatula between the toes and the apparatus, and try to widen it by a few millimetres. If that is not sufficient,



Fig. 25.—If the little toe is too much pressed upon, you free it by making small slits along the external border of the foot. One frees the internal border of the foot in the same way if the great toe be too much pressed upon.

split the plaster a little ; do not clip it transversely ; no, **cut longitudinally** the inner or outer side (as the case may be), for a length of one, two, or three centimetres, beginning at the free edge ; afterwards widen slightly the two lips of the gap, in order to give the toe a little more liberty (fig. 25).

And the same in the thigh, if the upper edge of the plaster presses into the soft parts, commence by sliding under the edge

a slender and even pad of cotton wool, and if, in spite of that, the patient still complains, split the apparatus for the length of a few centimetres, widen the lips of the gap made, and introduce a layer of cotton wool to protect the skin from injury.

We will now describe :

- (a) The method of **strengthening** the plaster ;
- (b) The manner of **repairing** it ;
- (c) The method of **making openings** into it ;



Fig. 26.—A broken apparatus, which must be repaired and strengthened.

(d) The method of **removing** it and performing the **toilet of the limb**.

(a) **How to strengthen the plaster.**

If the plaster seems too fragile, whether it be some minutes, some hours or some days afterwards, you strengthen it in the following manner :—



It is the **whole** of the apparatus which needs to be strengthened. You commence by applying over the whole surface a layer of thin plaster cream (equal parts of water and plaster), then, over this, you spread two attelles (of a single layer of muslin), one of the attelles in front, the other behind, then a third, and a fourth (always of one thickness only); and over all you roll one or two plastered strips. If it is only at **one** or



Fig. 27.—How to repair a plaster: After having slightly moistened the region with *very thin* cream, you apply a large square of muslin, of one thickness only, impregnated with the cream, then a second, then a third.

**two points** that the plaster is weak you apply, at these points, going beyond the limits of the weak portion, a similar layer of plaster paste, then several squares of muslin (fig. 27), lastly, two or three turns of plastered strips (fig. 28).

#### (b) How to repair the plaster.

And when the plaster is cracked, or broken completely (fissure or fracture) a long or short time after its construction,

it is not generally necessary to replace it; one may very well repair it and make it sound again (fig. 27, 28) proceeding in pretty nearly the same way as in strengthening it.

First of all remove the débris of plaster which borders on the crack, then roughen the surface with a knife; you hollow out little depressions with the point, as you prick the ice with your alpenstock to obtain a grip; you damp afterwards the



Fig. 28.—Over the squares, several layers of plastered strips are applied.

irregular and jagged surface with some thin plaster (equal parts of plaster and water).

When the plaster is soiled, its whiteness can be restored by the application of a film of paste made with these same proportions of plaster and water.

When it is softened by urine or by pus, the soiled part is cut out and replaced by squares or attelles held in position by a few turns of plastered strips.

Do not use thick paste or attelles of several thicknesses; this is the secret of success in these immediate (or late) repara-

tions, which pass as difficult. If the paste or the attelles are too thick the new pieces will not incorporate with the old plaster, whereas in the method I have just described, the union is very intimate and very firm, and you will be as expert in repairing the "old" as in making the "new."



Fig. 29.—How to make an opening in the plaster: The piece to be removed is first marked out, then cut with a knife, going through the whole thickness of the plaster; the piece is lifted out by one corner and removed altogether.

### (c) How to make an opening in the plaster.

Make an opening in the plaster as you do in trimming, cutting layer by layer, very gently, until you experience a sensation of cutting the tissue of the jersey, and no longer the plaster.

There is often an indication for the making of an opening:—

To inspect a projecting fragment of bone, a sore, an abscess, a fistula, etc.

One ought to note these different points and protect them by a double square of gauze, when constructing the plaster.



Wait, before making such openings, until the plaster is dry (at least 24 hours), unless however it be a matter of urgency, for example, in the case of a sore suppurating freely, which should be dressed the same day; or in case of a bony projection which ought to be put back as soon as possible, if you wish to save the already threatened skin; in these cases, make the opening half an hour after the plaster has set.

Just as in trimming, one makes use here of a knife well



Fig. 30.—When the piece is removed one cuts the jersey diagonally and folds back the flaps: the skin is laid bare.

sharpened; cut millimetre by millimetre, until you come upon the soft tissue of the casing which you will more easily slit with the scissors.

You will not wound the skin if you proceed cautiously. The security will be still greater if you have remembered to cover the skin with a double jersey; it is then that you appreciate the value of this precaution.

Another good precaution, when you know beforehand that

you may have to make an opening at some point, is to place there (over the jersey, single or doubled), a little square of gauze of two thicknesses, or some fine cotton wool, before applying the first plastered strip. Thanks to this square, one is able, later on, to make an opening in the plaster at this point, without the fear of wounding the skin.



Fig. 31.—In the case of a sore : method of introducing the dressing beneath the edges of the opening.

The opening, generally square, should exceed by several centimetres, in all directions, the point to be watched or treated.

One closes the opening with an ordinary dressing if one is dealing with a sore (fig. 31), or, if one is dealing with a correction, with squares of cotton wool kept in position and well flattened by a few layers of stiff muslin, moistened and compressed ; or, better, with a Velpeau bandage (fig. 32 and 33).



Fig. 32.—The flaps of jersey have been turned down over the dressing.



Fig. 33.—The dressing is retained by a Velpeau bandage.



(d) **How to remove the plaster.**

The time having arrived for the removal of the plaster <sup>1</sup> it is *split in front*, in the same manner and with the same precautions as I indicated for trimming and making an opening, with this difference, that when the plaster has just been constructed it allows of being cut easily (even some hours or some days afterwards); whereas when some weeks or months older, it does not allow of being cut without some difficulty.



Fig. 34.—How to remove the plaster: The lines of section.  
(The plaster has been previously softened by a bath or by warm wet compresses.)

For this reason, you should commence by softening the old plaster along the line which the knife is going to follow. You damp it 10 or 15 minutes beforehand with sponges or with lint soaked in hot water. This facilitates very greatly the penetration of the instrument, and when it has cut a little way into the plaster, you keep on running some hot water along the groove; then you go on, in this way, damping and cutting, right down **to the jersey**; then you cut the jersey with the scissors.

<sup>1</sup> After some weeks, or maybe months, according as it is a fracture or an orthopædic affection.

But this method of removing the plaster is long and laborious ; it is infinitely more simple to plunge the patient, or, at least, the plastered limb, into a hot bath, for 15 or 20 minutes, whenever this is possible, that is to say, nearly always. As soon as the patient leaves the bath, start upon the plaster with a good knife. It will allow of cutting as easily as cardboard, and the section and removing will occupy one or two minutes (fig. 34 and 35).

This preliminary softening in the bath affords a still greater



Fig. 35.—How to cut the softened plaster by means of a knife : you raise the sides of the cleft to avoid wounding the patient.

security : the edge of the soft plaster allows of it being raised sufficiently by means of the fingers for you to be able to slip easily the handle of a spoon between the plaster and the skin, and you can then cut safely upon this improvised guide which you advance little by little towards the other extremity of the apparatus.

At the instep one is often delayed in making a complete section by a buttress of plaster which corresponds to the angle of flexion of the foot (fig. 36). But, if one proceeds with caution,

one can divide this plaster obstruction without scratching the skin.

As soon as the plaster is thus cut through from top to bottom in the median anterior line, one separates and raises the sides and so can remove it without difficulty. At the instep, however, I would advise you to make a second section at right angles to the first, before raising the sides. This second

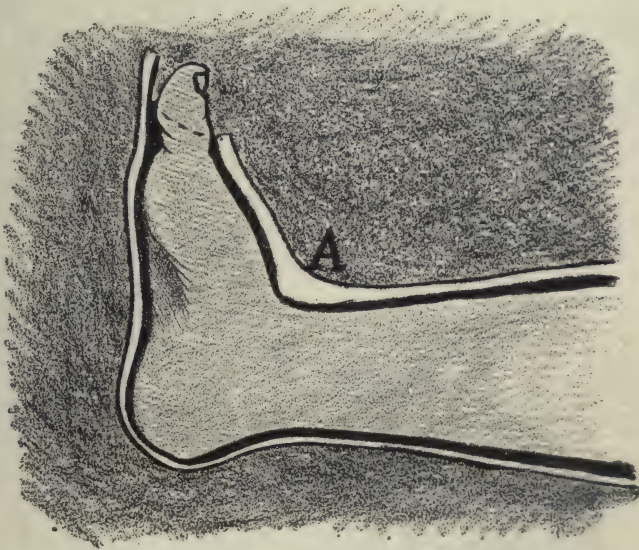


Fig. 36.—At the instep there nearly always exists a buttress of plaster which is awkward to cut (A).

transverse section is always indispensable when the plaster has not been softened by a bath ; it proves very advantageous in any case ; not only at the instep, but also at the knee (see fig. 34).

When you proceed to the separation of the sides (especially when the plaster has not been softened) you should move with prudence and method, making the effort symmetrically and equally, on the two valves of the plaster. Otherwise one twists



the limb and, in the case of a debilitated child, or one in whom the skeleton by disease has a lessened resistance,<sup>1</sup> there is a risk, by such torsion, of bending or even fracturing the bone.

A good precaution is to confide to an assistant the task of pulling very firmly on the foot, whilst you proceed, alone or



Fig. 37.—To remove the plaster, an assistant separates the sides while you raise the limb and pull upon the foot.

assisted, with the raising and separating of the two valves of the apparatus.

### The toilet of the skin after removal of the plaster

If one need not replace the plaster apparatus again, one is free to make the toilet of the skin in several stages. But, if it is necessary to re-plaster the limb, one makes the toilet at once.

One uses for this warm water and soap, afterwards damping

<sup>1</sup> For example, in the case of a congenital luxation of the hip, or in one of tuberculosis of the member.

slightly the skin with some ether or Eau de Cologne. If the skin is very scaly you may commence by rubbing it gently, for a few minutes, with vaseline, which has the effect of softening the scales of epidermis; you wash the skin with a swab of ordinary cotton wool moistened with a little ether or alcohol. Then turn the patient gently over, to make the toilet on the other side of the limb.

If, as is most unusual, you find, after removing the plaster, some slight irritation of the skin, eczema, or vesicles, you will attend to this carefully for a few days before replacing the plaster, by applications of oxide of zinc, or talc, or, better still, by radiotherapy. Failing this, you may leave the skin, with great benefit, without any dressing, lightly covering it with a piece of gauze, exposing it freely to the air for a few days, or, better still, to the sun for 10 minutes the first day, 15 the second, gradually increasing the exposure by five minutes a day.

## SUPPLEMENTARY DETAILS<sup>1</sup> ON PLASTER APPARATUS

### GOOD AND BAD PLASTERS

I have said that *to know how to construct a plaster* forms part of that minimum of information *indispensable* to all practitioners, nevertheless, there are few practitioners capable of making a good plaster; not that it is really difficult, no! but it is not taught in our schools. For that reason I must explain to you here, in detail, that which makes good and bad plasters.

<sup>1</sup> Consult that excellent book of my assistant in Paris, Dr. Privat, "On Plaster Apparatus."

**Bad plasters**

I mean by bad plasters,<sup>1</sup> plasters which are soft, friable, those



Fig. 38.—A bad plaster.

apt to lose their shape, heavy, ill fitting, consequently quite incapable of fulfilling their therapeutic function.

<sup>1</sup> Are the plasters of all "specialists" really beyond reproach? This is like asking: Do all surgeons succeed in procuring a faultless asepsis? Do we not find among them some who work by routine, who have indifferent principles, and who, alas! are unwilling to depart from them. But, as you know, there is no one so deaf as he who will not hear. And still, it is not more necessary to be a professional surgeon in order to be aseptic than it is necessary to be a specialist in order to make good plaster; you will succeed completely if you follow the technique here indicated.



These plasters, no more moulded to the body than a sentry box to a sentinel, are nothing more than *cache-misères* and deceptions ; they cover but do not support ; they hide a deformity, but they do not correct it. Moreover, they are uncomfortable or painful to bear ; they fatigue or injure—like a badly made boot (fig. 38 and 39).



Fig. 39.—Another bad plaster. These two figures, 38 and 39, show *how it should not be done*. Here are two plasters, much too large and not moulded : veritable loose trousers. One easily sees that a plaster made in this way (one saddle for all horses) is not fitting better than the glass case over a clock, and is incapable of thoroughly maintaining a correction.

And so it is absolutely necessary that medical men should know how to make good plasters ; for **without well-made apparatus there can be no good orthopædic cures.**

### Good plasters

The good plaster is that which supports and does not inconvenience ; those are its two essential qualities ; if into the bargain it is elegant, then the plaster is perfect (fig. 40 and 41).

**How to make a good plaster** (well fitting, comfortable and

neat)? First of all, it should be a **circular plaster** (made with strips) and not a **plastered splint** (made with the classical sixteen folds of muslin).

The **superiority** of the **circular plaster**.<sup>1</sup>—It is by far the **most accurate** (since it adapts itself to the depressions and reliefs of the



Fig. 40.



Fig. 41.

Fig. 40 and 41.—Here are two good plasters : accurate, well moulded.

Compare them with the bad plasters in fig. 38 and 39.

whole surface of the body) ; it is the **most comfortable** to the patient (because it supports him uniformly everywhere) ; and it is the **most simple** to make because, to mould well no matter in what region, it is sufficient to roll the plastered strips after the fashion of an ordinary muslin bandage, whilst it is impossible to mould exactly the

<sup>1</sup> The circular plaster is the best for the limbs as well as for the trunk, for fractures as well as for orthopædic affections.

plastered splints made up of 16 folds of muslin, without making coarse ridges which may wound the skin.

But, at once, you ask :

(a) How do you **inspect**, in circular plasters, some bad or suspected point (a fragment of projecting bone, a sore, an abscess or a fistula)? It is very easy : simply **make an opening** at that point, which opening will not lessen the support ; on the contrary, as we use it, one can



Fig. 42. — A bivalve apparatus allowing of complete examination of the limb, if need be, or the dressing of multiple sores. (The two valves are kept in contact by means of strips of sticking plaster.)

exert more pressure on a certain point, to push back a bony projection, such as a gibbosity.

(b) How, with a circular plaster, can you make a complete examination of a limb, if it be necessary ?

First, **such complete examination** will be rarely required ; moreover, could it not be better made by using a plaster splint ? Well, you should know that this examination is, in reality, **possible** (and even easy) with a circular plaster, seeing that you can divide the plaster into two valves which you can take off and re-apply as you wish.

(c) Finally, how are you to supervise the **nutrition** of the limb, in a circular apparatus ?

It is sufficient to ascertain the good condition of the toes and fingers, as we have already explained.



Any **alteration** in their *colour, warmth, or sensibility*, is the **danger signal** which allows one to know that there is trouble with the nutrition higher up, and to do at once what is necessary to remedy it with certainty; it is the **danger signal upon which you can always rely**.

Besides, these troubles of nutrition can only arise from some fault in the construction of the plaster, or from the breaking of one of the rules I have given.

And do not believe that this danger does not exist with splints. It does. I must even confess that the only really serious accident which I have ever observed to be caused by a plaster, occurred 25 years ago, in the course of my studies. After the application of a plaster splint to a fracture of the leg (in an alcoholic subject, it is true), total gangrene of the foot, and of the lower part of the leg, occurred, owing to some strapping having been too tightly applied.

#### A.—HOW TO MAKE A PLASTER WHICH WILL SUPPORT WELL

In order to support well, a plaster should fulfil two conditions: first, it should be **sufficiently long**; and, secondly, it should be **moulded** to the region.

##### (a) **The apparatus should be sufficiently long.**

It is necessary that the plaster should embrace not only the part affected, but also the two adjacent articulations.<sup>1</sup>

Thus, to completely immobilise an affected knee, the apparatus should include, at the same time as the knee, the hip and the ankle.

In order to better immobilise the ankle, the knee and the entire foot should be included.

If the plaster does not include the two neighbouring articulations, deformity within the plaster, and in spite of it, will appear or reappear (fig. 43, 44, 45).

And even the formula that the two adjacent articulations should be included is insufficient in many cases; for example, in a coxitis

<sup>1</sup> I was asked to see, in a large foreign capital, a patient suffering with Pott's disease in the dorso-lumbar region, who had had applied a plaster belt, reaching from the axilla to the iliac crest, the shoulders and the pelvis being entirely free! The patient, as you may well believe, moved about inside it rather like Diogenes in his tub. And yet, to speak correctly, the formula laid down that the two adjacent articulations must be included in the plaster was here adhered to: the formula is then inapplicable in certain cases.

during the acute stage, one should include below, not only the adjacent articulation (that is to say, the knee), but even the entire foot.

Still further: in affections of the spine, in an osteitis of the tenth dorsal vertebra, for example, it would be altogether insufficient, and even ridiculous, to include in the apparatus only the two articulations next to the affected part. Thus for orthopædic affections of the

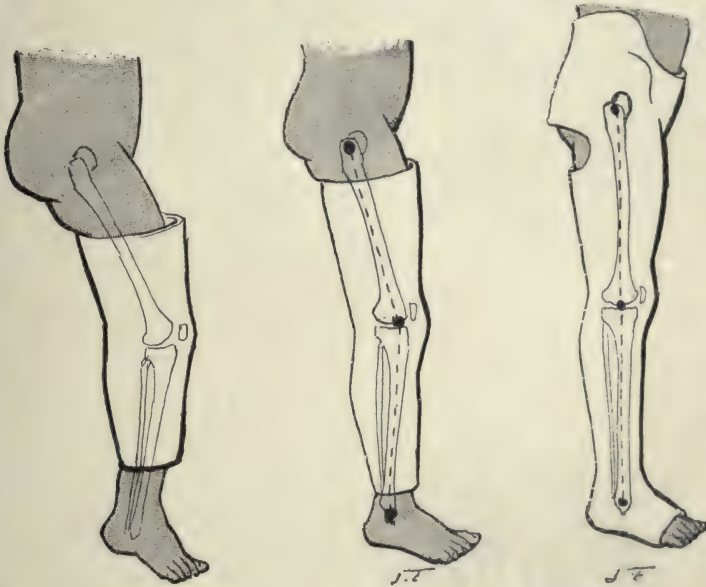


Fig. 43.

Fig. 44.

Fig. 45.

Fig. 43.—The short knee-piece too often made. Much too short and too large: the tissues are allowed to be indented by the edges of the knee-piece and deviation is produced at will.

Fig. 44.—A longer knee-piece, but again insufficient for the same reasons.

Fig. 45.—The perfect method of immobilising a knee. Our large plaster takes in, not only the knee, but also the two adjacent articulations.

back, whatever may be the seat, you must include in the apparatus, if not always the base of the cranium, at least the scapular and pelvic girdles (shoulder and pelvis).

We will mention elsewhere, in studying the different maladies, the dimensions to be given these apparatus, in each instance.

**(b) The plaster must be carefully moulded over the region.**

It should be as exact as if it were applied to the skin itself. One

might, strictly speaking, apply the plaster to the skin as is done in Maisonneuve's splints for fractures of the leg. But the plaster adheres to the hair, its direct contact is disagreeable, especially when made with cold water, which is the rule; it might have grave inconveniences when it is a question of a thoracic plaster; its removal would also be more difficult. For all these reasons, and also to ensure the cleanliness and good condition of the skin, it is better to cover it with a soft tissue—but with the proviso that nothing be omitted to ensure the accuracy of the apparatus—a condition which is evidently not always fulfilled when, as is often done, coverings of cotton wool of several fingers in thickness are used.

It is impossible, with a plaster applied over such a thick cushion, to restrain with precision a fragment of bone which is pointing, spinous processes which project, loose articulations which tend to be deviated. It is impossible, especially after some weeks, or may be months, when the cotton wool has become crumpled, and that always unevenly. This explains well how it is that plasters, applied after a redressment, often produce limbs, or a trunk, deformed (*e.g.* in Pott's disease, hip disease, or fractures).

What is to be done ?

When you **have only cotton wool** at your disposal, you may use it, provided that you apply only a *very thin layer*, as thin as possible, but in one piece : say, to fix your ideas, a layer of one and a half to two millimetres thick, spread out very evenly.

But, as you may guess, this is not to be done without difficulty ; and it is for this reason that I advise you **never to make use of cotton wool except in case of necessity**, and to prefer the casing of soft tissue.

This casing you will find anywhere. For the leg (as for the upper limb) a jersey sleeve or two jersey sleeves placed end to end ; failing a jersey sleeve, an ordinary sock for the leg and the foot ; for the trunk, an ordinary jersey, and for the large apparatus for the lower limb, still a jersey, but put on after the manner of a pair of drawers.

If the fabric of one casing is too thin, put on two.<sup>1</sup>

So much for the covering of the skin. Now for the mode of applying the bandages.

<sup>1</sup> The tissue of the Pyrenees and the lint recommended in some books are not sufficiently delicate.



I have said that *it is not sufficient to apply the strips exactly*, that it is *necessary in addition to mould* the plaster around the projections of the region; this moulding applies especially to *plasters of the pelvic region and the trunk* (we will return to this *à propos* the apparatus for coxitis and Pott's disease).

I have spoken of the necessity of **maintaining** the position of the limb **until the plaster has set**, but I wish to emphasise it, because this rule is violated every day in ordinary surgical practice. Bring to your mind what often occurs: The "chief" cannot remain any longer, judging that his importance calls him to more noble duties; he hands over the task of maintaining the position to an *externe* or to an obliging friend, who is not slow in losing his patience in his turn, although the plaster has not become *dry* (too often the plaster of hospitals refuses to dry, having depreciated), and he leaves it before it is "set": the correction is then lost in parts or altogether, and thus the final result is compromised.

You should continue the support right up to the setting, which will only require a few minutes, if you have taken care to procure good plaster and tested it beforehand, every time you have to construct a new apparatus.

#### B.—HOW TO MAKE A PLASTER WHICH WILL NEITHER BE UNCOMFORTABLE NOR CAUSE INJURY.

And first, an *axiom*: *a good plaster ought not cause discomfort.*

On the contrary, it should give a sense of security and of perfect comfort just, for example, as a well-made boot. The patient ought to feel more easy with it than without it! This is true to the letter; children who are taken out of a good plaster are impatient to return to it.

But let there be no misunderstanding. It may be that when it is a question of a first plaster, the patient complains of slight discomfort during the first few days, without there being any bad workmanship in the plaster, without any other reason than that of being unaccustomed to it. Thus an adult to whom a large plaster is applied for Pott's disease is liable to complain of a little discomfort during the first forty-eight hours, even with a well-made plaster.

In such a case one does not re-make the apparatus (nothing is to be gained by it). It is necessary only to help the patient with

soothing draughts and a few kind words, to get over the first few rather unpleasant hours, assuring him that to this discomfort will soon succeed perfect comfort.<sup>1</sup>

And, even more, when the plaster has been applied for a *grave injury* or after the laborious and trying *correction* of some deformity, the patient may be expected to experience some pain during the first



Fig. 46.—What is not to be done: do not pull on the bandage and cause cedema of the limb.

few days, without one necessarily concluding that the plaster is at fault. The pain will pass off gradually, whereas, *in a badly made plaster the pain would go on increasing.*

Let us see first:—

**Why a plaster incommodes, injures, or causes troubles of nutrition.**

It is first *because it is not accurate.*—*The first condition which the plaster should fulfil in order to be tolerated is accuracy.* One might believe, at first, that a very accurate plaster would be a

<sup>1</sup> We will describe *à propos* the plaster corset, the means of obviating almost entirely any discomfort by making slight temporary modifications in the plaster.

troublesome plaster ; well, it is the contrary that is true ; it is the very loose apparatus which brings about by its shifting, its incessant movement, a friction of the projecting parts of the plaster against the prominent parts of the body, which friction may possibly produce a slough.

Whereas, with well-modelled apparatus, the reliefs of the body are fitted immovably into the depressions of the apparatus, and there are no sores, or practically none, to be afraid of. But this need not



Fig. 47.

Fig. 48.

Fig. 47.—What it is not necessary to do. The foot is held in the position of equinus up to the moment of applying the plaster, and it is not straightened until immediately after that (see explanation of following figure).

Fig. 48.—The foot plastered in extension (see preceding figure) is carried immediately afterwards, before the plaster sets, to an angle of  $90^{\circ}$  ; creases are formed in front of this angle and will nearly certainly bring about a slough, or compromise a blood-vessel.

surprise you, since every one knows that a horse is injured, not by a tight collar, but by a loose one.

We have already described the method of making well-fitting plasters ; we will not return to it.

Second, ***because it is too tight at one point, or all over.*** Like a well-made boot, a plaster can and should be *accurate without being tight*.

The principal cause of tightness in a plaster, is that the bandages *have been pulled upon too much* when applied. We have mentioned



that it is a fault which beginners commit very often; they have a tendency to pull upon a plaster bandage as they pull upon an Esmarch bandage. It is necessary then to guard against causing œdema of the limb in this way. Do not think there is need to pull at the bandage in order to apply it exactly. No, it is sufficient to unroll it exactly over the circumference of the limb, as if one wished to take an impression of its contour, as it were, without subtracting anything, without adding anything. Therefore do not pull upon the bandages.

But there are other reasons for the plaster being too tight.

1. Because the **assistant** who held the foot **has drawn or pressed too firmly** upon the apparatus, before the plaster was set.



Fig. 49.—In case you should have committed the fault indicated in fig. 47 and 48, here is the way to remedy the formation of creases represented in fig. 48; you contrive a square opening in front over the ankle.

It seems hardly possible to avoid these slight accidents, when the foot itself has a tendency to deviate.

One can do so, however, by making it an absolute rule to correct all somewhat obstinate deformities before applying the plaster, and not adding in any way to this correction afterwards.

2. In deformities of the foot, if one tried, after having constructed the plaster on the foot in extension, to roughly flex the foot upon the leg (fig. 47 and 48) a buttress would be produced in front, a plaster ridge, capable of producing a blister, or even of arresting the circulation in the foot. It would suffice, it is true, to prevent all annoyance, to make an opening in the apparatus in front, in order to remove this pressure of the plaster (fig. 49).

Another precaution: the assistant **will alter the position of his hands** from time to time, change his hold, whilst the plaster is

drying: a continuous and prolonged pressure at one point may make a depression in the plaster.

Lastly, if, in spite of everything, there remains on the surface of the plaster flattened or deep impressions (fig. 50), caused by the application of the hands, one will make, immediately after the setting, openings at these points, replacing afterwards the pieces



Fig. 50.—During the drying of the plaster depressions may be produced by the side of the table upon which the patient has been lying, or by the hands which have been supporting the correction. Here is a specimen of such depressions.

removed by squares of plastered pads, or by some turns of plastered bandages (fig. 51).

This is how you can always, or nearly always, prevent the plaster from being troublesome. I say nearly always, for there are **exceptional cases** where a **plaster**, however well made, **may** cramp or **wound** the patient, owing to the nature of the lesion or to his generally bad condition.

1. **Because of the lesion:** for example, a pointed gibbosity or a fragment unusually prominent in some fracture of the tibia or of the clavicle may have penetrated the skin without any fault having been committed in the making of the plaster.

But, one can always, or nearly always, save the integument, even in that case, if one takes care to make an opening in the plaster immediately after its completion.

2. **Because of the subject:** for example, in some paralysed

subjects, the mere weight of the limb may, strictly speaking, cause a slough in the sloping parts, and the weight of the plaster alone produce a slough in front.

And you may see that also, though in a less degree, in very cachectic subjects.

Finally, we ought to say that we may meet with intolerant skins,



Fig. 51.—One raises, as shown here, or, better still, one scrapes out the parts crushed in and at once closes the openings by means of square plasters, or a few turns of plastered strips.

bearing contact with plaster badly, becoming very soon eczematous. But let me assure you that this is met with, hardly, once in a hundred cases.

#### **The Method of treating sores or trouble with the nutrition of the skin.**

In pointing out the causes of these troubles we have indicated at the same time the means of *guarding against them*, that is to say, their *preventive treatment*.

If these troubles do arise, this is the method of remedying them :

**First case.**—There are troubles with the circulation and the innervation of the limb.

These troubles are easily detected ; it is sufficient to examine the toes, and that is what one should always think of when a plaster is just finished.



Such troubles are due to the fact that the plaster is too tight everywhere.



Fig. 52.—This plaster was too tight in its whole extent ; it has been split from top to bottom and the edges separated.

In order to relieve the constriction, it is not necessary to remove

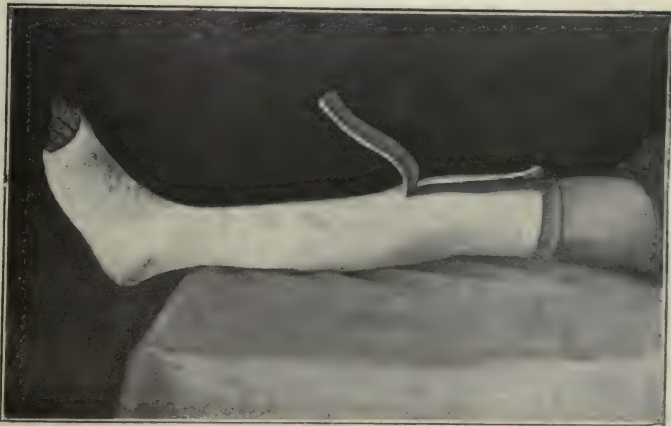


Fig. 53.—This plaster was too large ; a tongue-shaped portion has been removed in the median line.

the apparatus ; it is sufficient to loosen it by simply splitting it in the median anterior line, in the manner mentioned on page 35 and fig. 52.

When this anterior incision of the plaster and the consequent separation of the two lips have not entirely put matters right, not bringing back, for instance, the return of *sensibility*, as well below in the toes (or fingers), as above, you should open the apparatus behind or better, still, *remove it completely* and change it, guarding this time against the fault committed before of applying the strips too tightly.



Fig. 54.—The median tongue has been taken out ; the plaster is then readjusted by bringing together the sides, which are then maintained in contact by turns of plastered strips.

But, once again, if you are careful never to leave your patients who have had apparatus fitted, without satisfying yourself that the *nutrition* of the toes and fingers is normal, or is *becoming normal* again, you will never have any serious trouble.

We will allude, in passing, to the case of the **plaster which is too loose.**

This arises, as we have said, through the strips not having been applied exactly.<sup>1</sup>

<sup>1</sup> Except, however, in the case of fractures with swelling of the limb. In that case a plaster fitting on the first day, will not do so a week or two afterwards (see p. 76).

Can it be remedied? Yes, in the following manner :—

**The method of readjusting a plaster which is too large.**

You make an incision along the middle line in front, cutting out from one side, or from both, from top to bottom, a strip of plaster, one, two, or three centimetres wide ; after that you bring together the margins and fix them with a square of plastered muslin, extending over the two edges, or else with some turns of bandage (fig. 53 and 54).

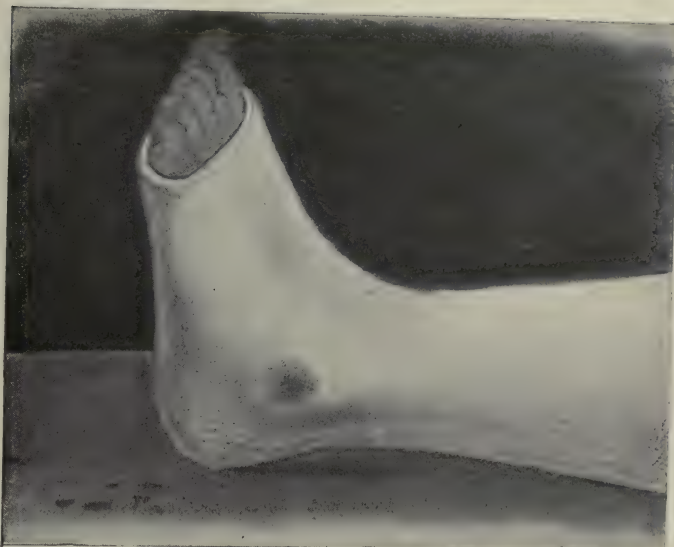


Fig. 55.—A stain produced by a slough ; this stain is tinted more deeply at the centre than at the periphery ; it is not got rid of by scraping the surface of the plaster ; on the contrary, it becomes more evident the more deeply the knife sinks into it.

But, in this case, it is still simpler and more satisfactory to replace the apparatus altogether. You should replace it in the case of a fracture, after the swelling of the limb has disappeared.

**Second case.**—There exists **pain, excoriations, or sloughs.**

Here the patient complains, one or several days after the construction of the plaster ; he indicates a *pain at a particular point* ; at the heel, the malleoli, or the knee. We have said that this ought not to be, that it was not in the programme. It behoves you to seek for the cause by *making an opening* in the plaster at this point.



The skin being laid bare ;

1. One finds *nothing abnormal*, or simply that the skin is *slightly reddened*. In either case, you powder with talc, and close the opening with a square of cotton wool and a few turns of soft bandage, taking care to inspect it again if the patient complains.

2. There is already a *small slough*.

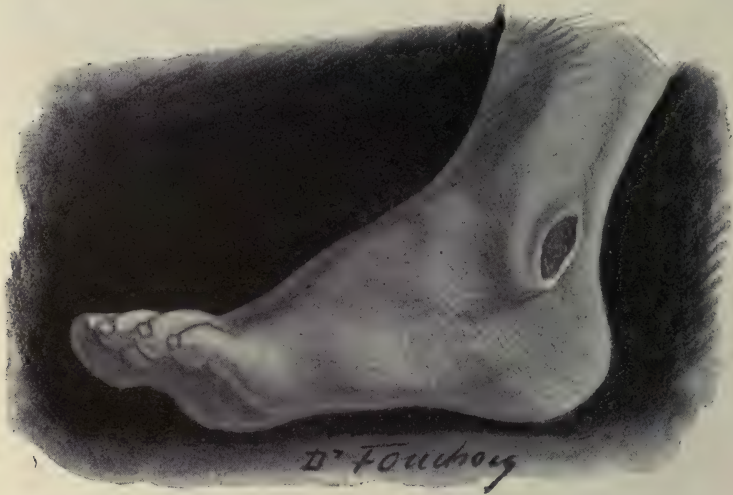


Fig. 56.—The first kind of slough ; that which excavates, that which destroys. It is seen especially in cachectic subjects. This variety is less benign than the following one (fig. 57).

Its treatment : To stimulate by the application of tincture of iodine, or of fresh Vigo plaster, etc., the vitality of the sloughy tissues.

Sloughs are exceedingly rare, if you have made no mistake in the technique. Nevertheless, they may be produced quite apart from any fault in technique, as we have said, in cachectic subjects. They may even be produced at any time, by the penetration, beneath the plaster, of a foreign body, small particles of plaster or of sand, various articles introduced by the patients themselves, buttons, medals, coins, hooks, pencils, etc., or even by the repeated soiling of the skin, with urine, pus, etc.

#### How to discover the slough.

One is warned by four signs, which are, in ascending order of frequency : (a) a slight elevation of temperature ; (b) a localised

pain; (c) a staining apparent on the surface of the plaster; (d) a disagreeable odour emanating from the plaster.

(a) Sometimes, though very rarely, the presence of the slough is announced by a slight rise of temperature.

If, in a plastered subject who has had no rise of temperature before the application of the plaster and has not been redressed nor sustained any serious accident, there occurs a slight evening fever of  $100.5^{\circ}$  to  $101^{\circ}$  one, two or three weeks later, one ought to think of the possibility of a slough having formed.

Seek immediately and see if you can find a disagreeable odour from any part of the plaster; if you do, make an opening at that point. If you do not, and in case of doubt,—after having waited eight or fifteen days at the most—split the plaster in two halves, in order to make a complete examination of the region.

And you would do the same if, after having found a slough and having dressed it through a small opening, you find fever persisting which is not explained by the said slough; in that case, cut the plaster in two halves, to assure yourself there is no slough elsewhere.

(b) Pretty often, it is the pain persisting at one point, always the same one (over a malleolus, the heel, the iliac spines, the sacrum, the knee), which discloses the slough.

At the seat of the pain, you make an opening in the plaster.

(c) **More often** still, you are attracted by the appearance of a **brown stain** on the surface of the plaster. Do not confuse this with the staining produced by urine, which gives the odour of urine and not of pus; it is rather yellowish and disappears on scraping the surface of the plaster, whereas the discoloration produced by a slough persists in spite of scraping (fig. 55).

(d) But the **most characteristic sign** of sloughing, is the disagreeable odour emitted by the plaster at one point; it is a special odour comparable to the odour of pieces of old dressing impregnated with pus,<sup>1</sup> an odour which makes itself apparent if one puts one's nose near the apparatus.

<sup>1</sup> And yet, this very disagreeable odour does not signify, absolutely, the existence of a slough; **the most disagreeable odours** are due to a **discharging eczema** more often perhaps, than to a real slough. But, in both cases, it is necessary to examine and treat the skin. You treat these eczemas with sterilised talc (rather than with vaseline), or, with daily applications of a layer a millimetre thick, of a black pomade known as

I have an attendant who passes his nose from time to time over the apparatus and quickly ferrets out even a commencing slough, to a certainty.

Here, **smelling is better than seeing.**

**How to treat a slough** (fig. 56, 57 and 58).

It is not necessary to remove the apparatus ; it is sufficient to

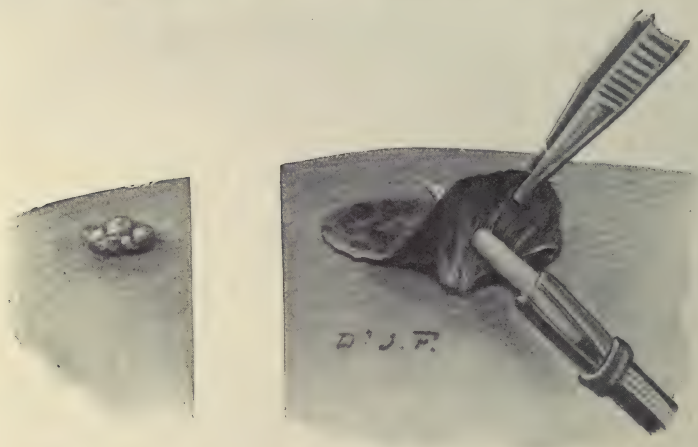


Fig. 57

Fig. 58.

Fig. 57.—The second kind of slough : that which fungates (cauliflower). In the first kind there was mortification of the tissues, here there is over-production. This second variety is very benign. One finds it especially in subjects of good general nutrition. Treatment : Get rid of the exuberant tissue by cauterisations of nitrate of silver or the thermo-cautery.

Fig. 58.—The second variety of slough (fungating), a stage further advanced. It shows itself in the form of a " mushroom " or of " cock's-comb " ; sometimes very large with a delicate pedicle. One cuts this pedicle with scissors, or destroys it with a pencil of nitrate of silver, as in this figure.

*make an opening*<sup>1</sup> at the place indicated by the discoloration of the plaster or by the characteristic odour. The slough being exposed and uncovered for three or four centimetres from the edges of the

naphthalan, and, better still, by radiotherapy, or exposure to open air or the sun.

<sup>1</sup> In the exceptional case of multiple sloughs, one turns the plaster into a bivalve, which allows one to make the dressing without suspending the support of the limb.



opening in the plaster, you cleanse it, touch the surface of the fungating wound with nitrate of silver, and then treat it with a layer of powdered talc, or with sterilised vaseline, or with naphthalan pomade. You dress it every day until it cicatrises, which it does very quickly (in 6, 8 or 10 days).

Given these indications, you should know how to avoid sloughs, or, if in spite of everything they occur, to recognise them quickly



Fig. 59.—A plaster which does not reach to the extremity of the limb ; it has produced a swelling of the free part.

and cure them very easily—in this way a slough ought to be a negligible incident.

**Another difficulty** possible after the application of a plaster (and which I wish to point out, being desirous of omitting nothing which may be useful to you) ; when you have stopped applying a plaster of the lower limb (or of the upper) for a more or less considerable distance from the toes (or fingers) you may possibly see a *swelling* of the free extremity of the limb (fig. 59).

What is to be done in that case ? Invariably the parents propose to you to pare down a little the lower border of the plaster. But if you cut it (or pare it) you will find the swelling will appear higher up. Instead of cutting the apparatus, as the parents request you

to do, it would be better to lengthen it; instead of freeing the limb, it would be better to bandage the free portion, and that is indeed what you will do (fig. 60).

You will apply, then, over the swollen part of the limb, a cotton wool dressing; gently introduce a little of this cotton wool (a layer 2 or 3 millimetres thick) between the lower border of the plaster and the skin, and you will afterwards cover this wool dressing with a soft muslin bandage, or better, a Velpeau bandage, going



Fig. 60.—In the case of swelling of the free part of the limb, do not pare round the lower border of the plaster, but make a slit longitudinally, following the axis of the limb to the extent of 3 or 4 centimetres, then raise gently the edges of the incision in order to pass between them and the skin a layer of wool; afterwards compress a little the free part of the limb with a Velpeau bandage, commencing at the toes and rising up to the lower limit of the plaster.

methodically from the extremity of the limb up to the plaster, and overlapping it with one or two turns of bandage.

You bandage the leg in the same way from the toes up to the knee, if it is a question of a swelling of the leg or foot, due to an apparatus stopping at the knee.

And the same for the upper limb.

Look at it the same evening or the next day and you will see that the swelling has already almost completely disappeared; re-apply the same compressive wool bandage, and renew it every two or three days, until the tendency to swell no longer exists.

If it persist, provided it is only a slight degree of swelling, no

inconvenience will be caused by continuing this slightly compressive treatment.

But if the tendency is too marked and persists beyond fifteen days, you slacken the plaster by splitting it from top to bottom ; you afterwards separate the two edges by 2 or 3 centimetres and keep up this separation after the manner described at p. 59, in the case of a plaster which is too tight.

Finally, one last remark ; *when an opening is made* in the plaster, it must *always be closed*, otherwise the skin would be cut against the sides of the openings. You reclose it by applying over the exposed part, squares of wool, the sides of which are lightly packed between the edges of the plaster and the skin, and kept in position by several turns of soft bandage exerting a certain amount of compression (see p. 44).

**Is there no precise contra-indication against the employment of Plaster ?** For example, the age of the subject. No : it is possible to plaster the very young (for example, for club-foot) as, also, very aged persons (for example, for a fracture).

Simply, it will be necessary in those, as in the paralysed and cachectic, to make an inspection nearly every day, inspecting the nutrition of the toes (or the fingers), by which means you will avoid any disagreeable surprise.

In young children, because of the frequent soiling of the plaster, it would perhaps be advisable to change the apparatus rather more often—it is only a little inconvenient after all.

### Résumé and Conclusions

You see that I have not hidden from you any of the incidents or accidents possible after the construction of a plaster. I have done so to make it possible and easy for you to be on your guard. But, I should have failed in my object and I should have misrepresented things, if I had left you with the impression that it is a “horribly difficult” thing to succeed in making a good plaster, and that with the existence of so many pitfalls to avoid, with so many dangerous headlands to double, it would be better not to venture upon it. Such a conclusion would be in reality quite erroneous, prejudicial to your patient and yourself, so that it is my duty to dissipate it.

No : to sum up everything, when you have a plaster to make, spread your bandages **accurately**, but **without pressure or traction** ;



*mould* the plaster afterwards by pressing it **around the prominences** and not over them; **correct** bad positions **before** applying the plaster; **maintain** the correction without **altering it**; **make an opening** in the plaster immediately after it is set if it appears to be too depressed at any point; **split** it from top to bottom, if you consider from the condition of the toes, that it is too tight in its entire length.

All this is sufficient—and there is no “sorcery” in it—to avoid all accidents, or, at least, all serious accidents.

### C.—HOW TO MAKE ELEGANT PLASTERS

The ideal as we have said, is to make plasters not only comfortable and accurate, but even elegant; to unite to the *tuto* the *jucunde*. Besides, the two things go nearly always together. An accurate



Fig. 61.—The apparatus in the rough before polishing.

plaster could not be ugly, because it reproduces the form of the human body. But if, in addition to those proportions, you give to its surface a **polish** and a **brilliancy**, then it will be perfect.

And do not think that this prejudice for making elegant

plasters is of no importance in practice ; on the contrary, it is by this that the relatives judge you most often !

And by what would you expect them to judge you, before a definite result has been obtained, which may require several months, or even years ? By what, if not by the comfort (or discomfort) due to the apparatus, and by the elegance (or the ugliness) of that apparatus ? Therefore, train yourself and spare no trouble to make really presentable plasters.

In place of a clumsy piece of work, strive to make what I may call a work of art. You will be able to do it if you set your mind on it.<sup>1</sup>

In order to produce an elegant plaster, one polishes it.

### The polishing of the plaster

There are **two procedures** ; first, **immediate polishing**, done as soon as you have rolled the last plastered strip, before the plaster sets.

The second, **late polishing**, done *when the plaster is dry*, that is to say, two or three days after its construction.

The first procedure, the most convenient, the most rapid, has not the same æsthetic value as the second, but it is nevertheless sufficient, and it is that which I advise you to adopt in practice, because the other demands much time and experience. In our practice, it is nearly always the second which is employed, it is true, but only because our assistants or attendants relieve us of this duty. But if you have, however, any one whom you could train once for all, use the second method : if not, reserve it for special occasions, "*ad usum Delphini*," for a case where you are decided neither to save time nor trouble, to arrive at the most beautiful result possible. In all the other cases, you will keep to the method which follows.

### Immediate polishing

There are several methods of performing immediate polishing. This is, after having tried all, that which I have found the most simple, the most practicable and the best for you ; it is to cover the whole surface of the apparatus with a sheet of plastered muslin.

<sup>1</sup> It is done, for example (one may say it, I think, without presumption), by all the doctors at Berck, who, it is true, place in it their *amour-propre* and pride themselves in making good plasters. And they themselves profit by it, as one of the factors of the apparatus. The plasters of Berck are known far and wide. And even at Paris it is admitted, that where plasters are concerned, the apparatus of Berck rank as high as those of Paris.



Fig. 62.—The plaster apparatus polished. The polishing has had the effect of effacing the external roughness and rendering the apparatus smoother and more glossy.



Fig. 63.—Immediate polishing, to be done after having rolled the last strip and applied the last layer of cream. The way of doing it ; over the apparatus, a large square of plastered muslin is applied, which is closely flattened and any creases effaced by pulling firmly on the sides which are crossed over each other behind.



After the application of the last strip and of the last layer of plaster, you cut a large square of muslin of a single thickness, making it of the same length as the apparatus and of a breadth a few centimetres more than the greatest circumference of the limb. You soak it in what remains of the plaster, or in a new mixture; you smooth afterwards with the flat of your hands the two faces of this square, well spread out, after which, you will apply it immediately over the apparatus, beginning by adjusting the centre of the square along the median line of the anterior surface of the apparatus, flattening it down afterwards and laying the two flaps of this "outer casing" over the sides of the plaster, up to the middle line behind, where you cross the superfluous portions of the lateral flaps over one another. The edges overlap more or less according as the limb is more or less thin; where the overlapping is excessive, where you have too much material, for example, at the instep, cut off the exuberant portions with the scissors; take care to allow a few centimetres for the two flaps to unite the one with the other.

It is all the better to apply the sheet of muslin in front, in order that the edges may be drawn behind, where they are not seen (no little detail should be disregarded, seeing that we wish to have the apparatus as neat as possible).

The application of this supplementary sheet of plastered muslin, serves, among other things, to strengthen the plaster.<sup>1</sup>

### Later polishing of the plaster

This polishing is done about 48 hours after the plaster has been constructed, when it is dry. You commence by softening the outer surface with thin plaster paste; one, or one and a quarter, cup of water to one cup of plaster of Paris. You pass the hand over the whole surface of the plaster, or you may use a swab soaked in this watery paste.

After two or three minutes, a softening is produced; take advantage of this for levelling, with a knife, the surface of the plaster, clearing away all the angles and ridges, after which, over this

<sup>1</sup> Keep to this method, and I dissuade you from polishing by pasting on the apparatus two great placards of dry muslin (not soaked in plaster); it is a dangerous procedure for you; it hastens the setting of the plaster and, for that very reason would not allow you time for making a good modelling—to say nothing of the fact that this procedure in "quickening" the setting of the plaster, deprives it in the end of its firmness.

carefully levelled surface, you spread a coating or glaze of thicker plaster, made with two cups of plaster of Paris to one cup of water.

The best manner of proceeding is: put half a cup of water into a basin slightly inclined (at an angle of  $30^\circ$ ), then, in the upper part untouched by the water, put in reserve a cupful of plaster of Paris. Keeping the basin inclined, take a pinch of plaster between the thumb and fingers, dip the finger ends into the water withdrawing them immediately, still holding the pinch of plaster which has now become a paste. This is spread over a small part of the surface of the apparatus, in a layer of about a millimetre in thickness; afterwards smooth over this surface with the hand or with a swab soaked in the water which you keep in the tilted part of the basin. Then, take another pinch of plaster which you moisten in the same way, and cover another portion; smooth it down equally and so on, until the whole of the apparatus has been polished.

You get in this way a glossy apparatus, and the plaster after a few months, comes to resemble very fine old ivory.

We have often been asked for the secret of the composition of the polish employed in obtaining the beautiful plasters of Bereh. You see, there is no secret, no mystery; the polish is simply a layer of plasterpaste, with which—if one has a little practice and some dexterity—one can make the most beautiful plaster apparatus in the world!

We may add that it is easy, when the plaster is soiled, to recover its whiteness. This can be done by passing over the surface a swab soaked with very thin plaster (equal parts of plaster of Paris and water).

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## THE USE OF PLASTER IN THE TREATMENT OF FRACTURES

First. You should **apply your plaster immediately**, as soon as you see the patient, **without delay**, even in the case where the limb is swollen; all you have to do when the swelling has disappeared, after ten or twelve days, is to replace the first plaster by a second one more accurate.<sup>1</sup>

Secondly. You must treat all your fractures, not with box splints but with **circular plasters**, for the reasons you already understand,

<sup>1</sup> If, after the twelfth or fifteenth day, the plaster seems slightly slack there is no need to change it; tighten it by cutting out a strip from the anterior face of the apparatus, as described on p. 64.

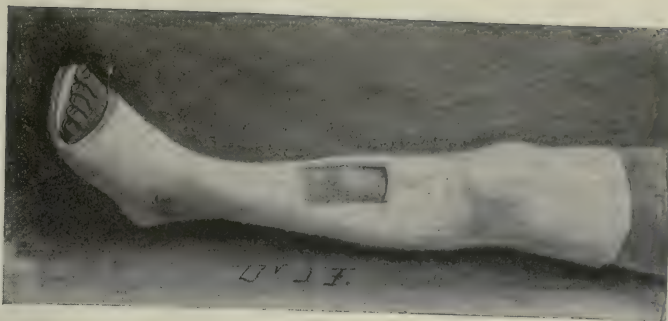


Fig. 64.—Fracture of tibia with projecting fragments; on a level with the fracture an opening is made in the plaster through which to compress the fragments (with squares of cotton wool kept in position by a bandage).



Fig. 65.—Fracture of clavicle with displacement. One compresses the projecting fragments through an opening in the plaster.



for with a circular plaster, the patient will be at once *more comfortable* and *better supported* ; you will obtain the most perfect results by this method.

By constructing the circular plaster in the manner explained, by

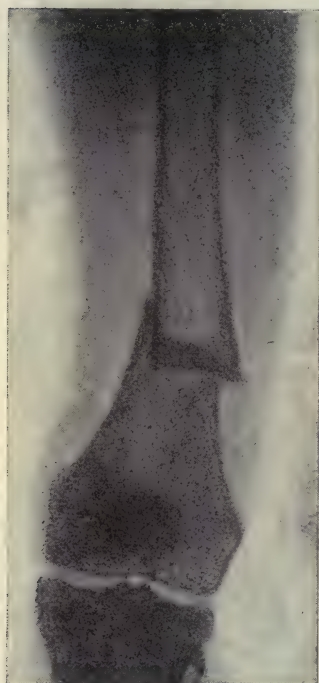


Fig. 66.—Radiogram; fracture of femur at the lower third; angular displacement and slight overlapping of the fragments.



Fig. 67.—Reduction of the fracture has been effected under anæsthesia; radiogram taken through an opening in the plaster apparatus: the displacement remains as before in spite of very powerful traction exerted on the foot.

inspecting afterwards the condition of the fingers and toes, you have *no need to fear* the good nutrition of the plastered limb.

(a) What should be done in the case of a fracture **complicated with a wound** ?

Make an **opening** in the plaster (a few hours after its construction) through which to dress the wound.

If there are **several wounds** you can resort to the construction of a **bivalve plaster**.

(b) In the case of a **projecting fragment**, for example in fracture of the tibia or clavicle:—

Exert **pressure** on the fragments of the tibia, or of the clavicle, **with squares of wadding** held by strips of adhesive plaster. You exert pressure in a manner similar to that of compression of a Pott's gibbosity (see Chap. V.).

In the case of fracture, the pressure should be made less over the summit of the projection than upon the parts adjacent to the bony fragments.

#### **Fracture of the Patella.—**

Treat in the same way, by compression. Arrange strips of cotton wool around the two segments of the patella. Proceed in a similar manner in fractures of the **olecranon**.

#### **Fracture of the Femur.—**

Here again, we make, rather than the generally extolled extension, a large plaster, because with an accurate plaster we obtain results far superior to those formerly obtained by Hennequin's apparatus.

The plaster should be very carefully moulded on the pelvis; before setting, one pushes against the ischium from below upwards, while vigorous traction is made on the foot. By making an opening in the plaster it is possible to perfect the correction in the



Fig. 68.—In the plaster an anterior opening has been made opposite the fracture; this has allowed of a progressive reduction of the displacement being effected. For some days afterwards, the progressive reduction was carried on by pads of wadding, pressing inwards on the upper fragment, and outwards on the lower fragment and renewed every three or four days. This radiogram was taken after the removal of the plaster, six weeks after the accident. Compare with it fig. 66 and 67; it can be seen that the result obtained is perfect.

way illustrated. Here, for example (fig. 67 and 68), is a case of fracture of the lower third of the thigh, where the radiogram shows projection of fragments which immediate reduction, made under chloroform, was not able entirely to efface.

We made an opening in the plaster at that point and applied pads of wadding, above and outwards at one part, below and inwards at the other, consequently in opposite directions, to push the two fragments into line gradually.

This very energetic compression was kept up by strips of adhesive plaster, and renewed every three or four days.

One can see, by comparison of the radiograms (fig. 66, 67 and 68), all the steps of the correction, and the perfection of the result ultimately obtained by this method, so simple and benign. Is there another method (surgical operation or extension) which would give, I do not say a better, but as good a result ?

For fractures of the arm or fore-arm one should be guided by the same principles.

## REMOVABLE APPLIANCES AND APPARATUS<sup>1</sup>

Precious as plaster apparatus are, they do not suffice for all our needs. We shall see this in studying each deformity.

By this time you will have found out that for many patients the *plaster apparatus* may be contra-indicated, because it is *not movable*, nor *articulated*; and that in some other cases, it will be rejected simply because it *is* plaster.

I will explain myself :

First. In certain diseases, the patients require to be supported by an apparatus, but with **the possibility of its being taken off** from time to time, in order to follow some physio-therapeutic treatment : massage, gymnastics, bathing, electricity, etc.

Example : the scoliotics (and you know they are legion).

Example : patients afflicted with infantile paralysis.

For some of these, an apparatus may be indispensable, for ten or twenty years, and sometimes for life. It cannot be a plaster, but it may be some light apparatus, articulated and removable.

Secondly. There are other conditions where the treatment commences with plaster and is terminated with a *removable apparatus*.

<sup>1</sup> See, on this subject, the admirable thesis by our assistant at Berck, Dr. J. Fouchet.



Example : tuberculous orthopædic affections (Pott's disease, hip disease, white swelling).

The plaster is worn up to the period of convalescence ; but at this period, when the patients are allowed to stand, it is advantageous to replace the plaster by a removable apparatus, which fills in the period between that of strict immobility and that of entire liberty.

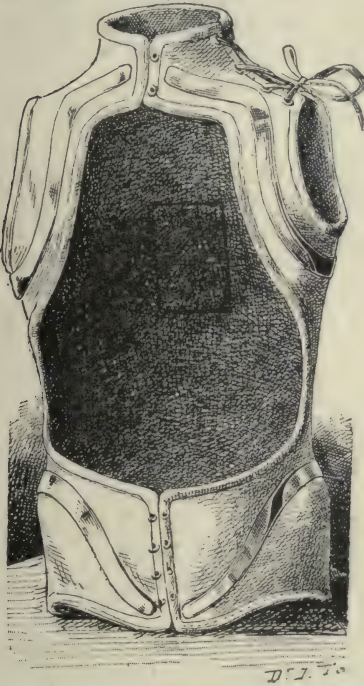


Fig. 69.—Celluloid orthopædic corset, with armature.



Fig. 70.—A large orthopædic apparatus in celluloid. For the hip and entire lower limb.

By taking off the apparatus each night, and even for a little while each day, the muscles are exercised and strengthened, the joints are loosened, gently and spontaneously.

There are other deformities (such as congenital club-foot, genu valgum, tarsalgia) where plaster is indicated immediately after the correction, in order to maintain it completely.

But after some weeks or even months, the correction ought to be preserved by a lighter apparatus, which may be taken off at will, in order to safeguard the nutrition of the muscles and the play of the joints.

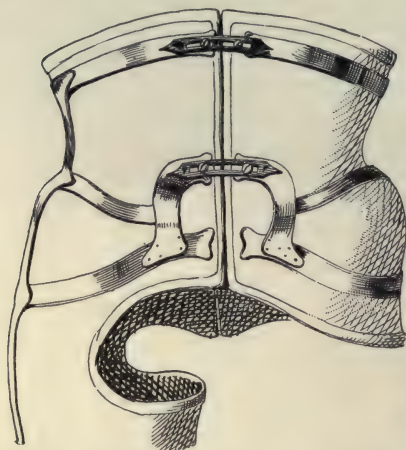


Fig. 71.—Dorsal aspect of the apparatus shown in fig. 70. The two halves of the pelvic portion are joined behind by two sliding pieces allowing for an increase in the diameter of the girdle.

Thirdly. You will find many patients, especially among the upper classes, who ought to wear a plaster, but the parents will not have it at any price.

And why? Simply because *it is a plaster*, and because they are frightened, or rather humiliated, by the prospect of seeing their children immured for months, perhaps for years, in a “block of masonry.”

A leg plaster, that may pass; but to be imprisoned in a great “pillory” of plaster which takes in the trunk entirely and even also the head, that, never!

What is to be done? Give it up? No. One can still at the last extremity treat them and cure them without plaster, by means of movable apparatus—although it involves a little more trouble and more time.

Ah! An apparatus which you can remove when you wish to, yes, they will agree to that, or, at least, they will consent to try it, inasmuch as celluloid is a better tolerated article than plaster, with its bad reputation.

They will try the celluloid, and, what will happen? Very soon—having become accustomed to it—the patients, instead of being tortured, find themselves much better with the apparatus than without it; they no longer wish it to be removed; they cannot do without it, so that this removable apparatus becomes, as a matter of fact, irremovable; and so it goes on to the cure; but there was a right way to render an apparatus acceptable and that was, that it should not be a plaster one.

You see already how numerous are the indications for removable apparatus. Here are still more.

(a) You are consulted by a man of very active habits, suffering with

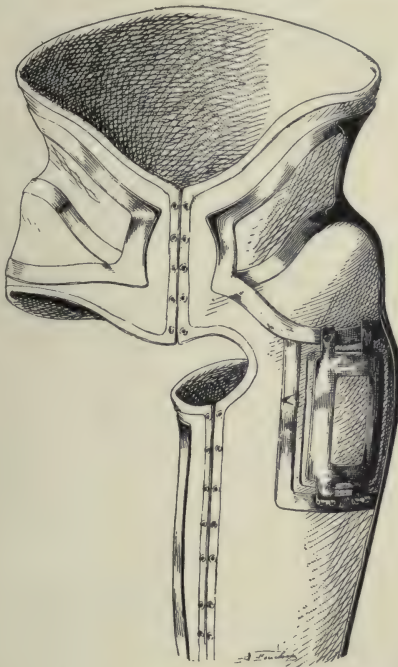


Fig. 72.—The same apparatus with a window-shutter opening to allow inspection of an abscess.



Fig. 73.—An articulated apparatus in celluloid for the hip. A bolt allows the joint to be fixed or loosened as may be desired.

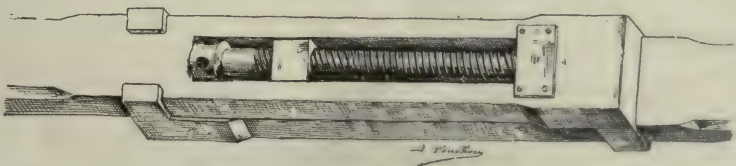


Fig. 74.—Thanks to this broadpitched screw adapted to the femoral part of the same apparatus, it is possible to produce a certain amount of traction on the limb.



Pott's disease; he will not comprehend that he ought to keep at rest in a large plaster, or rather, cannot, he says, having a family dependent upon him. He asks for a movable corset which will admit of his getting about and seeing after his affairs.

(b) Several times I have seen these patients with Pott's disease, "broken-winded" and bronchitic, asking for a support which would accommodate the thoracic movements. I have sometimes supplied for this object, a plaster with a very large opening, but they prefer a movable corset. Also, through especial anxiety to ensure the frequent toilet of the skin, many ladies of fashion prefer celluloid to plaster, etc.

So that, although plaster is always sufficient for the treatment of fractures,

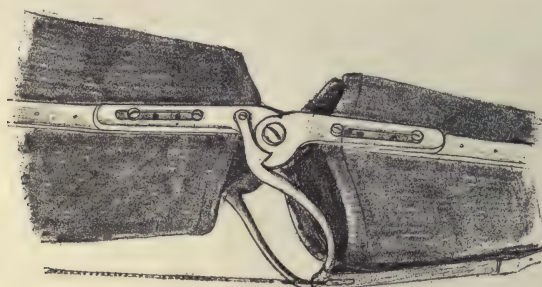


Fig. 75.—The bolt which fixes the knee-joint in extension for walking and which the patient can draw and unhinge, by means of a cord, in order to bend the knee-joint when he wishes to sit down.

it may not be possible, in the treatment of orthopædic affections, to ignore movable apparatus.

You will object that there are many patients unable to meet the expense of a movable apparatus, or to procure the help of the "Assistance Publique," still very defective in our country districts.

What can be done for these patients?

One thing only (not sufficient for all cases, but for most of them).

That will be, whenever possible, to finish the treatment with a plaster as in the case of treatment of fractures.

Come to the worst, it can be done for all deviations other than infantile paralysis (and it can be done even in certain cases of infantile paralysis).

It can be done in cases of hip disease, white swelling, Pott's disease, the patient being allowed to stand and take his first steps still wearing his plaster apparatus. But we will return to this subject further on, *à propos* these different diseases.

## VARIETIES OF REMOVABLE APPARATUS

## 1. Removable apparatus in plaster.

Why not make removable apparatus in plaster, which will have the advantage of cheapness and of being constructed by yourselves ?

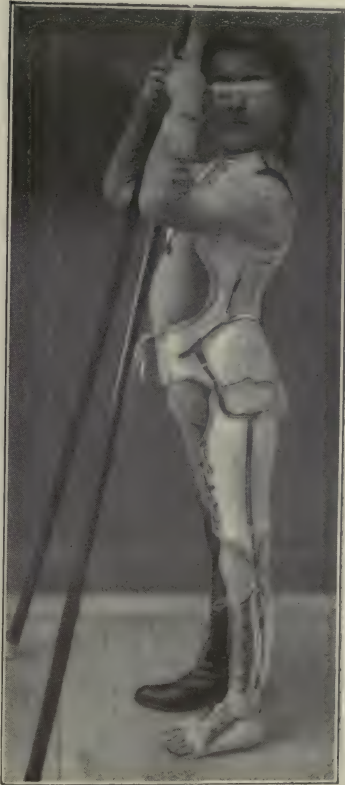


Fig. 76.

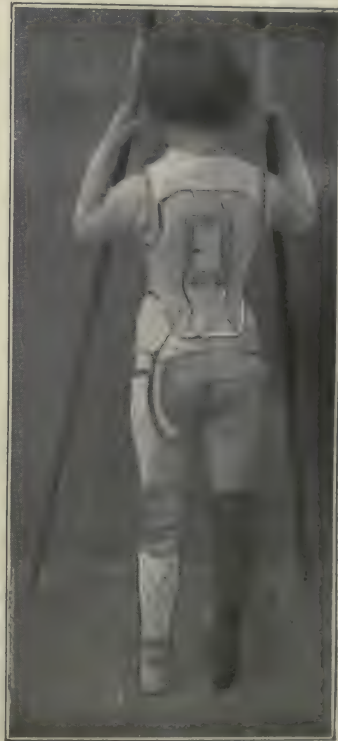


Fig. 77.

Fig. 76 and 77.—A celluloid apparatus embracing the trunk and lower limb for co-existent Pott's disease and coxitis. The limb portion may be separated, when desired, from the trunk portion, which thus becomes an ordinary corset.

Because they are **heavy** and **fragile**, and not capable of being

**articulated.** Therefore, I do not advise you to make use of them in a general way.

Indeed, either the parents are able to meet the expense of the celluloid apparatus (which is much better than the movable plaster), or they are not; if not, it is much better to conduct the treatment to the end with an immovable plaster, more simple to make and more effective than movable ones.

There remain, however, cases where a movable plaster is indicated. We will point out all those different cases as we go along, *à propos* each disease. But we may say, for the present, that one

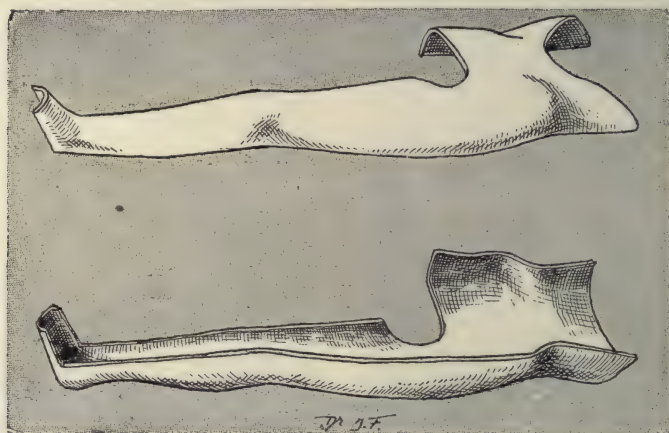


Fig. 78.—A large bivalve plaster for the lower limb.  
The two valves are kept in position by bandages or by straps.

uses the movable plaster in all cases of multiple fistulæ, or where the skin is very irritable<sup>1</sup> and eczematous, requiring daily dressing, or, still more, in a breathless or very nervous subject, who wishes to train himself to wear his plaster, by keeping it on, at the beginning, only a few hours daily.

Movable plasters are useful again in *certain white swellings* (of the elbow, the wrist or the ankle) *during the period of injections.*

<sup>1</sup> In these two cases, the apparatus will be rapidly soiled and should be renewed very often. It will therefore be much more practicable here to use movable plasters than celluloid, the frequent renewal of which would become far too expensive.



To be effective and durable, the removable plaster should be bivalve.

But it is not possible to make it of a single piece, that is to say, opening only in front, as in a celluloid apparatus. Plaster is not a sufficiently elastic material for that; made in one piece only, it will crack inside and lose its form almost immediately, after having been taken off and replaced scarcely four or five times.

### The Bivalve Removable Plaster

#### *Method of its construction*

You commence by making an ordinary plaster in the manner already explained; and, when it is dry, after a few hours, or, better still, after a few days, it is divided into two valves, by symmetrical incisions at the sides, or before and behind.

To obviate the risk of damaging the skin when dividing the plaster, you should use two jerseys—or better, over a single jersey, corresponding with two lines already marked out for two incisions, place bands of wadding three or four centimetres wide and half a centimetre in thickness or, better still, two strips of zinc, such as one uses in moulding (see p. 94).

The jersey, which remains attached to the inner surface of the apparatus, serves as a natural lining.

It is easy, afterwards, to reapply such a movable plaster.

The two halves are replaced in contact by their edges, and kept so by means of straps or a few turns of Velpeau (if one has to take it off every day), and strips of sticking plaster (if taken off only now and then); or again, one may fix it with hooks stitched to the strips of linen (fig. 79) which are attached to the edges of the apparatus with plaster paste, or white silicate of potash, or even with ordinary glue.

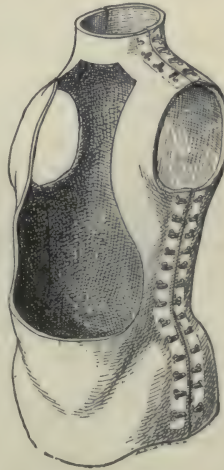


Fig. 79.—Removable plaster corset which can be fixed and unfixed by means of hooks attached to the edges.

## 2. Removable Apparatus in silicate of potash and leather Apparatus.

I only speak of these to *dissuade you* from using them.

Indeed, apparatus in silicate are too **heavy** and too *friable*.

As for leather apparatus, they are *not firm* (they do not keep their shape without steel supports), they are *heavy*, not *clean*, and are *evil smelling*.

## 3. Apparatus in celluloid.

Do you wish for an apparatus *light, firm, clean, really neat*?

Then use *celluloid*.



Fig. 80.—The positive mould (for coxitis).

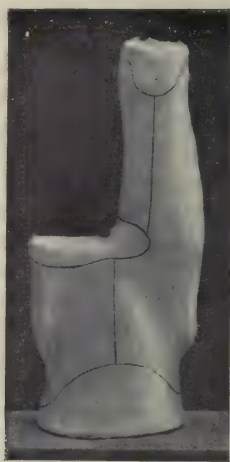


Fig. 81.—The celluloid has been constructed upon the mould; it has not yet been removed from the mould (see fig. 99).

Celluloid, taking more than twenty hours to solidify, cannot be constructed, like plaster, on the subject, who would have fifty times the chance of losing the correction before the celluloid became solid. It should be constructed on a mould (fig. 80).

You may prepare the celluloid yourself if you wish.<sup>1</sup>

<sup>1</sup> As we used to do formerly. Indeed, we constructed the first celluloid apparatus in France.



Fig. 82.—Method of constructing a celluloid apparatus (for the hip). Squares of muslin are spread upon the mould with a brush dipped in celluloid paste.



Fig. 83.—Construction of the celluloid corset. On the positive mould, and covering the whole of its anterior surface, is applied a square of muslin. (Another square is applied afterwards on the posterior surface.)



One constructs it with squares of muslin impregnated with celluloid paste. This paste is made with acetone and the débris of celluloid (about five parts of acetone to one of celluloid).

Instead of using muslin strips, one uses squares.

The squares are made of a length equal to half the circumference of the mould. The first square is applied in front, the second behind, the third on the right side, the fourth on the left, alternately, so that the celluloid apparatus has a thickness everywhere of sixteen sheets of muslin or thereabouts. The



Fig. 84.—The construction of a corset (continued). By means of a brush steeped in the celluloid paste, the square is flattened down, at first in the median portion.

thickness ranges from 8 to 10 sheets (for a hand apparatus) to 20 sheets (for a large celluloid corset for an adult).

A brush is used for applying the celluloid. One commences by applying over the mould a layer of oil, then a square of muslin (impregnated with the paste); one pulls upon it, to adjust the edges, afterwards a layer of the celluloid paste, then a sheet of muslin, and so on. One lays on the celluloid and the squares after the manner of bill stickers.

One may construct the celluloid apparatus in the rough at one sitting of

about half an hour; after that, over the last sheet of muslin, two or three coatings of paste are laid on, repeating this every three or four hours, until one reaches the number of 10 or 12 coats; this will give the celluloid polish and brilliancy.

After that, leave it to dry for two days, without touching it. Then the celluloid may be taken off for the fitting.



Fig. 85.—The construction of a corset; (continued). The edges of the square are coated over, while you pull with the other hand to efface the creases.

To take it off, one cuts along the lines, where, later on, one will attach the fastening (fig. 81).

The fitting having been accomplished, it is replaced on the mould; the metal strengthening pieces and joints, if there are to be any, are added.

But if you have not the aptitude for work of this kind, you run the risk of failing; in any case, much time and care will be required of you, especially when the apparatus is to have several joints. It is infinitely simpler, more practical, and finally, less costly, after having taken the mould, to send it to the special workers in celluloid.<sup>1</sup>

<sup>1</sup> Such as we have at Berck, in the Orthopédie Institute, and as there are now almost everywhere in France.

They will construct the apparatus and return it to you if necessary for a fitting, and, after that fitting has been done by you on the patient, who in this way need not be disturbed, they will trim and finish the celluloid.

*Thus the whole thing will be reduced to your taking the mould and fitting the apparatus, two things very easily done, if you proceed in the following manner :—*

### 1. The Moulding.

You have never made one, and the very thought of having to take a mould dismays you. Very well, be reassured ; without having



Fig. 86.—Moulding the ankle. Cover the skin with an ordinary stocking cut off at the toes to allow a strip of zinc being inserted between the skin and the stocking over which the mould may be cut, in order to remove it.



Fig. 87.—Placing the attelles for the moulding of the ankle. You commence by applying squares of plastered muslin. Over these you roll a plastered strip.

made one, nor having even seen one made, you will succeed at the first attempt, for to take a mould, it is sufficient **to construct an**



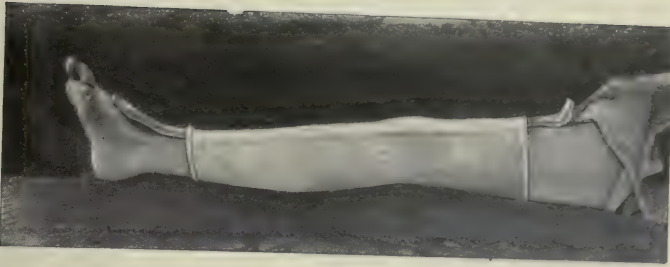


Fig. 88.—Moulding the knee: the leg is covered with the sleeve of a jersey, underneath which has been passed a strip of zinc about three centimetres wide.



Fig. 89.—The position of the zinc strips in moulding the lower part of the trunk and lower limb (for a small celluloid apparatus in hip disease).



Fig. 90.—Moulding the trunk. How to place the strips beneath the jersey.

**ordinary plaster** on the bare skin, and to remove the plaster after it has set; after which, the edges of the plaster are brought together, to restore its shape, and thus a perfect negative is obtained.

The position in which the patient is placed for moulding is, as a general rule, the same as that adopted in constructing a plaster apparatus for the same region.

For the lower limbs (foot, leg, hip), it should be the horizontal position; for the trunk, the vertical position.



Fig. 91.—Cutting a mould for the knee.

You cut over the zinc strips so as not to wound the patient.

The patient touching the ground completely with the feet is lightly supported (I do not say suspended, but supported) by the head, by means of the classical strap (fig. 248 and following). For the upper limb, the upright position.

But we will now go into details. There are *two precautions* to be taken.

1. In order that the plaster may *not adhere to the skin* and to the hair, a thin but continuous layer of vaseline is applied over the whole of the region to be moulded.

You will find in hospital practice many timorous patients who dread the contact of plaster with the bare skin. For these you

should make a mould over a closely fitting casing (a jersey, a sock, a stocking). This fabric makes a protective lining to the inner surface of the mould, and comes off with it. So that the adhesion of the covering with the plaster may be more intimate, you commence by spreading over the outer surface of the covering, a layer of plaster cream before applying the plastered attelles and strips.

2. To prevent all risk of wounding the patient in removing the mould, you place immediately over the skin one or several strips of



Fig. 92.—Cutting a mould of the thigh.

zinc three or four centimetres wide, upon which you can cut the mould afterwards, as upon a director.

The strips being placed in position, you have only to *construct the plaster*.

You do this with attelles and strips of muslin, after the manner of an ordinary plaster. You may introduce some slight variations meanwhile, thus :

(a) Begin the apparatus by the application of squares or attelles, and finish with plastered strips.

b. To hasten the drying of the plaster, that is to say, to save time, you may here use tepid water, at  $35^{\circ}$  or  $40^{\circ}$ , or even cold water with salt (two or three teaspoonfuls of salt in each of the two basins in which are the attelles and strips).

This premature drying would have some drawbacks to the firmness of an ordinary plaster which has to be kept on for a certain





Fig. 93.—Cutting a mould of the trunk.



Fig. 94.—The mould having been removed, the edges are approximated and held in contact by several turns of soft muslin bandage.



Fig. 95.

Fig. 96.

Fig. 95.—A negative mould (of the trunk) placed upon a bench in readiness for the pouring in of the plaster cream, that is to say, for the preparation of the positive (see following figure).

Fig. 96.—The positive mould obtained from and taken off the negative mould of the preceding figure.

time ; it has none here, where the mould is intended to be done away with after a few hours, when it has served its purpose.

It goes without saying that as soon as you have applied the strips and attelles, before the plaster has **set**, you **verify the position** of the region to be moulded and model the articular or peri-articular prominences. You model also the edges of the zinc strips.



Fig. 97.—The celluloid corset finished. When it is dry, cut it along the median anterior line and above each shoulder, in order to remove it and to carry out the fitting on the patient.

Immediately after the setting of the plaster (or some minutes after) you remove the mould by cutting with a bistoury or an ordinary knife over the zinc lath, and right down to it, that is to say, you cut also the jersey ; you then raise the edges of the mould and, thanks to the covering of vaseline and the jersey, the mould detaches itself easily from the skin, without any tugging painful to the patient.

One proceeds with the removal gently and cautiously, so as not to crack the apparatus.

One then brings together the edges, and one keeps them in contact either with a breadth of plastered muslin which, overlapping the two edges, will serve as a "clasp," or with a muslin bandage rolled round the entire mould.

In order to construct the "positive" one has only to pour into the mould a quantity of plaster cream.<sup>1</sup> But you may avoid this trouble, by employing a worker in celluloid; send him the negative mould, such as it is, and he will reproduce the "mannequin" upon which he will construct the celluloid apparatus.

At the end of a few days, as I have already said, he will be able to send you the celluloid so that you may fit it upon your patient.

#### **Fitting the celluloid apparatus**

**Utility of fitting.**—You may think that the celluloid, having been constructed on a faithful mould, does not need to be fitted; nevertheless I advise you to fit the apparatus *whenever it may be possible*.

It will afford you an opportunity of correcting, with absolute precision, the length and breadth of the apparatus, the level of the lines of the joints, the situation of any openings, hollows, etc.

Thanks to such fitting, you will be able to obtain, still more certainly, a perfect apparatus, that is to say, without it causing any discomfort to the patient, and thoroughly fulfilling its object.

#### **Fitting the apparatus for the foot**

The celluloid is sent to you (by the constructor) in two pieces, one for the foot, the other for the leg, which are divided opposite to the line of the tibio-tarsal articulation, or rather a little below it, on a level with the axis of movement of that articulation. Without this division it would be very difficult to apply the apparatus round the ankle.

It goes without saying, that each piece has been split along the anterior median line where the finished apparatus will be laced.

The fitting is done upon the skin, bare, or covered with a sock or very thin stocking.

The two pieces of celluloid are placed in position in turn, pulling them firmly apart in front (this may be done without cracking, thanks to the elasticity of the celluloid).

Notice that the corners of the celluloid, not yet trimmed, are

<sup>1</sup> I refer you, for all the details, to the thesis already mentioned of my assistant, Dr. Fouchet.



almost sharp, and to prevent them pinching or lacerating the patient's skin, when the apparatus is put on, you should take care to take these corners between your fingers, calling in the help, if need be, of one or two bystanders.

Verify the upper and lower ends of the apparatus, and especially the width of each piece. If they are a little too wide, let your assistant make the two sides overlap one another, and chalk out from



Fig. 98.—Fitting an apparatus to the foot: the leg portion and the foot portion have been divided opposite the tibio-tarsal articulation and split in front.

top to bottom, the line of crossing of the edges, that is to say, the limits of the small strips of celluloid to be removed.

If the two pieces are a little too narrow, you mark, in the same way, the distance which separates the two edges, so that the maker may increase, by so much, the width of the fore piece, with a flap of soft leather added to it. One does not leave, in fact, the rigid anterior edges of the celluloid, which would make it difficult to take off and put on the apparatus. One replaces it by two strips of soft leather with eyelets.

The foot and leg being covered with their sheath of celluloid, see that the prominences of the malleoli correspond well with the depression in the celluloid. This will satisfy you that the metallic joints are well on a level with the natural articulations, and that the pieces of steel will not exert any abnormal pressure on the bony prominences.

You can afterwards mark the limits of the hollowing at the ankle, which hollowing varies with the degree of flexion you wish to have. But you may be able moreover to dispense with that, for with your written instructions, the maker will be able to give the apparatus the amount of play desired.

For the rest, in a general way, restrict yourself to tracing with chalk the slight modifications which appear to you necessary, without cutting anything off yourself. The maker is furnished with tools to execute more easily and neatly the alterations you require.

He supplies afterwards the apparatus with its articulations, the mechanism of which will enable you to leave them rigid or loose according to your liking.

But you will apply the celluloid to the patient yourself, and superintend its use.

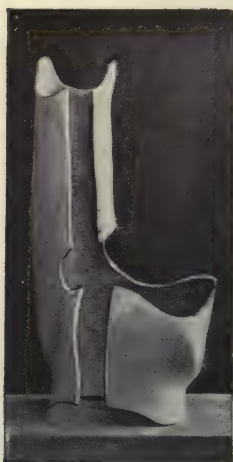


Fig. 99.—A small celluloid for hip-disease opened and separated from the mould. It is ready for FITTING.

### Fitting an apparatus for the leg

In the same way, when fitting on an apparatus for the leg, it is necessary to make certain that the depressions of the apparatus correspond well with the particular prominences of the region; to verify also the length and width, and to mark with a pencil, the level of the line of the knee-joint (the line which corresponds to a horizontal passing through the apex of the patella); and, finally, you should mark on the celluloid, on a level with the popliteal space, the large piece to be hollowed out on the two leg and thigh pieces of the celluloid in order to permit the movements of flexion of the knee, in cases where you wish to preserve those movements. But,

as in the apparatus for the foot, you may dispense with that; the maker should easily know, with your written instructions,

how to make the posterior hollows and give the articular play required.

**Fitting a celluloid for the hip and one for the entire lower limb**

The constructor sends you the large celluloid in four segments; pelvis, thigh, leg and foot, which facilitates greatly the fitting.



Fig. 100.—Fitting an apparatus for the hip. The manner of putting it on when single handed. First, open and introduce the pelvic segment, then the femoral. If you have an assistant, you can, with his help, open and introduce the two segments at the same time.

When the hip or the knee ought to remain rigid, he sends you three segments only.



The small celluloid for the hip is in one piece only.

See fig. 100 for the method of putting on the apparatus.

You commence by placing in position the pelvic segment, the girdle; then you put on the femoral segment. In order not to injure the patient in doing this, cover the angles with cotton wool or with your fingers. The edges are kept in contact either with your hands, or with straps encircling the pelvis and the two segments of the celluloid.

You make certain, here again, that the depressions in the apparatus correspond with the prominences of the region. You verify the length and width of the celluloid.

It should be possible for the thigh of the opposite side to be flexed to about an angle of  $90^{\circ}$ ; it is necessary to remember that, in order to allow, if need be, the apparatus the same amount of flexion. If it is desired to put on this (the sound) side a strap of leather or soft material (to prevent the celluloid from rocking) you should indicate the points of attachment and the length and breadth of the strap. Lastly, the upper edge of the apparatus, in front, over the abdomen, is cut in the form of a crescent, in such a way that the middle portion leaves the umbilicus uncovered.

We will describe, in the chapter on Pott's disease, the method of fitting on the celluloid corset (see p. 320).

## CHAPTER II

### ON ANÆSTHESIA IN ORTHOPÆDICS

#### I.—LOCAL ANÆSTHESIA

(a) *Cocain* and *Stovain* are not often used in Orthopædics. They may be used, of course, to perform a tenotomy, when tenotomy is the only interference required; that is very rare; but in torticollis, in congenital club-foot, in old hip-disease, division of the tendon is not the only factor in the correction, and vigorous movements for straightening are indispensable before and after the tenotomy. These manœuvres nearly always require general anæsthesia.

(b) Ethyl chloride as spray is the ordinary local anæsthetic for puncture of an abscess and for intra-articular injections (see fig. 111, p. 127).

This anæsthetic is sufficient, provided that it is used with care; one waits, to introduce the needle, until the skin is blanched over an area the size of a five-shilling piece. Old patients always ask for "a little more ethyl chloride."

But avoid the direct and prolonged contact of ethyl chloride with integument which is already reddened and thin, the vitality of which is very low, as the chloride *might* reduce it still more. In that case produce the anæsthesia on the sound skin, some distance away, and there you will puncture.

#### II.—GENERAL ANÆSTHESIA

This may be produced by **chloroform**, or by **ether**.<sup>1</sup>

If you are accustomed to ether, you should keep to it; if

<sup>1</sup> I do not see any advantage that ethyl-bromide has over chloroform, and I myself use the latter even for the removal of adenoid vegetations.

not, I advise you to prefer chloroform. Ether is, it is true, a little more easy to administer than chloroform; but it exposes the patient to grave inflammation of the air-passages, which may lead to pulmonary gangrene and abscess of the lung, and more than that, during the whole of the anæsthesia, ether keeps the patient in a state of manifest asphyxia which sometimes becomes alarming.

Therefore, you should employ **chloroform by preference**. There are two remarks to be made on its use in orthopædics.

(a) The first is that chloroform, as a general rule, is ***much better tolerated by children*** than by adults, who are nearly always more or less out of condition, or are alcoholic, atheromatous, emphysematous, etc.

(b) The second is that, in orthopædics, anæsthesia ***does not need***, in an ordinary way, to be pushed to ***its extreme limit***, for example, as far as in abdominal surgery, where it is necessary to avoid the least reflex movements of the intestines. So, for the correction of a congenital luxation, a coxitis, or for a club-foot, it is sufficient that the patient is insensible to pain and unable to make any movement of a nature likely to hinder the operator; in other words, it is sufficient that the muscular resistance is overcome and that the patient does not cry out. You may then, in orthopædics, be satisfied very often with an anæsthesia such as you would use to reduce a traumatic dislocation of the shoulder or perform taxis in a case of hernia.

Now, here are some points indispensable in chloroformisation. I think it is not a digression to give them here, because they are too often violated or misunderstood, and they do not appear to me to be clearly set forth in the large treatises on surgery.

**The absolute criterion**, the only one, to know if the subject—infant or adult—put under chloroform, sleeps sufficiently, but not too profoundly, is to see that **his corneal reflex** is retained. *It is necessary, during the whole operation,*



*that the reflex be preserved, whilst the general sensibility and the resistance of the muscles of the limbs are abolished.*

By the corneal reflex, one means the contraction, *active and immediate*, of the eyelids (always appreciable in the upper eyelid), when it is left free, after having been stimulated by touching the cornea of the patient with the index finger (fig. 101



Fig. 101.—The corneal reflex. First stage: the anaesthetist has partly opened the eyelids of the patient and placed the tip of his index finger on the corneal.

and 102). If the patient is insensible and inert, at the same time that the contractility of the eyelids persists, the anaesthesia is sufficient for what is to be done ; orthopaedic corrections, and surgical operations.

Anæsthesia has then been sufficiently “pushed.”

One is certain that it is not too much so, as long as the corneal reflex remains. Security is then complete.

During the whole of the operation, do not exceed this degree either on this side or on that, but preserve it by a few drops of chloroform administered from time to time.

*When the patient has lost the corneal reflex, one does not know where one is, and it may be one has gone too far.*

Apart from the corneal reflex, no sign is of absolute value. The respiration, the pulse, the colour of the face, the dilatation and contraction of the pupil, do not signify very much. The respiration may even remain perfect, the pulse normal, the face of a rosy colour, the pupil contracted, and everything,



Fig. 102.—The corneal reflex. Second stage: the anæsthetist, after having touched the cornea, quickly removes his hand to allow the eyelid to close. The eye ought to close firmly, *in an active fashion*, which can be recognised by the wrinkles which are formed at the commissure.

in a word, may appear up to that point satisfactory, when suddenly, without any warning, the respiration and the pulse stop, and then, it may be too late.

Rely then entirely on the corneal reflex; it alone will not deceive you.

*The skill of the anæsthetist consists especially in attaining this condition, and in keeping constantly to this degree of anæsthesia, taking care on the one part, not to allow the patient*

to awaken, which is evidenced by the movements of defence of his limbs or by his complaining; preventing on the other, narcosis becoming too profound, which is ascertained by the loss of the ocular reflex.

In the first case, if the patient makes some movements of defence (still being unconscious), give him six or eight drops of chloroform every eight or ten respirations (do not hurry, do not give the chloroform in large quantity at this moment) until again he is motionless.

In the second case, when the ocular reflex has been lost, stop, do not give any more chloroform until the reflex has reappeared, and so on, until the end of the chloroformisation.

**1. The ordinary method of producing sleep.**—For children who understand, above 10 years of age, proceed gradually by slight and continuous doses as you would do for an adult.

Every six or eight respirations, throw six or eight drops of chloroform upon the outer surface of the mask, turning it quickly over the child's face.

**2. The method of producing sleep instantly.**—If the child is very small, or very nervous, if fear and alarm cause him to cry and struggle violently at your approach, if he resents all your coaxing, if he will not be soothed nor listen to anything, it is better for him that you proceed expeditiously and put him to sleep quickly.

Whilst his hands and feet are held, quickly throw fifteen or twenty drops of chloroform upon the mask and apply it quite closely to his face, without allowing the admission of any pure air. His cries will at once cease; the child struggles for scarcely six or eight seconds; he quickly loses all knowledge of his surroundings. You keep the mask in position for ten or fifteen seconds only. The child's face is a little congested, but it is already motionless, having, however, the ocular reflex still plainly marked.



You proceed from this moment cautiously, with six or eight drops every six or eight respirations, the face regaining its rosy hue in a few seconds.

If the first whiffs of chloroform have not been sufficient to abolish the defensive movements in a child of six or seven years, for example, give a second dose, proceeding as has been already explained.

During narcosis always take care to support the patient's



Fig. 103.—Withdrawing the tongue; with the left hand the tongue is drawn out of the mouth; the index finger of the right hand firmly turning out the labial commissure from the dental arches.

chin with your fingers; that facilitates the respiration greatly. If he vomit, it is because he is awakening. Give him another dose of chloroform, slowly, without too much hurry; that would be dangerous.

If respiration has ceased (but that will not occur until the ocular reflex has been lost, which will not occur if carefully watched) one should immediately draw out the

child's tongue with special forceps, or, in default of them, with a safety-pin, keeping it outside by exerting slight traction on one side, the head being turned and laid on that side, whilst, with a finger introduced into the mouth between the teeth and the opposite cheek, the cheek is raised (fig. 103).

This manœuvre of withdrawing the tongue and raising the cheek suffices nearly always to restore the breathing.

If it does not suffice, perform artificial respiration. Remember that in such a case it is the only thing to be done, and do not waste time in doing anything else. The anæsthetist supports the head, not too much flexed, not too extended, on the table: to allow it to hang over the table, as advised by some authors, is bad; it might produce too great tension, and consequently a partial closure of, the air passages. An assistant holds the legs as a counter-resistance to the traction which you yourself make on the upper part of the trunk, in manœuvring the arms to produce artificial respiration: but I need not insist on that—you know all about it. The manœuvres of artificial respiration are studied and illustrated in all the treatises on minor or major surgery.

I wish to conclude with two observations:

(a) When you are about to redress a case, you should not allow the patient to awaken until the proceeding is quite finished and the plaster "set." Allow the patient to awaken gently.

(b) Lastly, I wish to point out that when the patient is ready to awake, he appears sometimes to have lost his ocular reflex and his respiration becomes all at once silent. Do not be alarmed; press a little harder on the cornea, and you will see the eyelid react; moreover, the complexion instead of being pale, is here as rosy as that of a person sleeping naturally.

## CHAPTER III

### THE TECHNIQUE OF PUNCTURES AND INJECTIONS

#### I

#### IN TUBERCULOUS SUPPURATIONS

TAKE note from the beginning that this technique is the same for all tuberculous suppurations, as well for hip-disease and Pott's disease as for cold idiopathic abscesses.

#### SUMMARY OF THE TECHNIQUE.<sup>1</sup>

##### A. What it is necessary to obtain.

1. As to **instruments**: a needle, No. 3, a small aspirator, a glass syringe (all these instruments should be capable of being boiled).

2. As to **modifying liquids**: 2 flasks, one of **oil, creosote, and iodoform** (oil 70 grammes, ether 30 grammes, creosote 5 grammes, gaiacol 1 gramme, iodoform 10 grammes).

The other of **camphorated naphthol with glycerin** (camphorated naphthol 2 grammes, glycerin 12 grammes); this second mixture should be shaken vigorously for a minute and a half and injected **immediately**, because it is very unstable.

These two liquids are all that are required.

The **indications for each**: As a general rule, inject the first of them (the oil). You may reserve the second (camphorated naphthol) for the case where an abscess contains clots blocking the needle, in which case two or three injections of camphorated naphthol will soften and dissolve the clots; after which, you return to the first liquid.

The **dose** to inject is the same for the two liquids, namely, 2 to 12 grammes, according to the age of the patient, for abscesses of a capacity of 20 c.cm. and more.

If the abscess is very small, less than 20 c.cm., you inject half as much liquid as pus withdrawn. In this way all hyper-tension of the skin is avoided.

3. Obtain also (a) a tube of ethyl chloride for local anaesthesia and some

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<sup>1</sup> If you are pressed, for time, content yourself with reading this summary where are collected all the leading ideas—returning later to the reading of the entire chapter.



tincture of iodine for sterilisation of the skin; (b) a small cup, to contain the liquid to be injected; (c) and, lastly, a sterilised dressing.

## B. The Technique.

*When should you commence the punctures?*

Immediately the abscess is plainly perceptible, provided you can get at it without danger. (But this danger only exists for deep abscesses in the iliac fossa; here, you may postpone the puncture until the abscess has become easily accessible.)

In this technique, there are two points to be observed: be *very clean* and use *fine needles only*.

(a) To be **very clean**; be quite sure of the asepsis of your hands, of the patient's skin, of the instruments, of the liquids to be injected, and of the after dressing.

(b) Employ only **fine needles** instead of the large trocars generally used; keep to our No. 3 needle (which has an outer diameter of only one and a half millimetres).

Needle No. 4 must only be used when the abscess is far removed from the skin and its contents very thick. In no case should a needle larger than No. 4 be used.

### Other important points.

(c) **Puncture in healthy skin**, at a distance of 4 or 5 cm. from the abscess, in such a way that the two orifices in the skin and the abscess are separated by a long oblique track.

(d) And at **each new puncture**, pierce the skin at a **new point**.

### How many punctures?

You may make several punctures and injections (from **7 to 8** and not one only)—for the cure will be so much more certain than with one puncture only.

### At what intervals?

When should the second puncture be made? Ten days after the first.

And the others at equal intervals of from **10 to 12 days**. After the seventh or eighth sitting, the walls of the abscess are so sound, so healthy, that it only remains to seek for their **adhesion**.

With this object, at the last sitting, after having made a last puncture (without injection) you **compress** the region, beginning at the extremity of the limb, with layers of cotton wool, held in position by 2 or 3 Velpeau bandages. Every four or five days one adds over this dressing a new Velpeau bandage which keeps up the pressure to the degree required.

On the fifteenth or twentieth day, the dressing is discontinued. The abscess is cured.

The duration of treatment of a cold abscess (essential or symptomatic) takes then, from two to three months on an average.

All well-informed medical men of to-day know that of the three treatments proposed for the external tuberculoses:

(a) **operation**; (b) **abstention**; and (c) **puncture with injection**; the last is the best (we will tell you in Chapter IV. why it is the best). But how many know how to apply this best treatment? Very few.

Oftentimes one may see, by the side of abscesses opened by surgeons, other cold abscesses which have become fistulous **in spite of** punctures and injections, or even **because of** punctures badly made.

Does this mean that puncture is difficult? No, not exactly, but it must be performed with scrupulous care, and no one has ever taken the trouble to teach practitioners the details.

Everything depends upon the way it is done.

Well done, puncture cures; it is a marvellous method.

Badly done, it leads to failure, sometimes to accidents; it may even bring about death (in the case of abscess by gravitation, of coxitis or of Pott's disease).

This is why it is your pressing duty, your "sacred" duty, to study the technique thoroughly.

You may make mistakes in three ways: by the use of unsuitable instruments, by lack of asepsis, by faulty technique.

### 1. By the use of unsuitable instruments.

You may go to work (it is unfortunately the rule) with needles or trocars too large; the orifice in the skin does not close, and there remains a fistula.

### 2. By lack of asepsis.

On the pretext that it is not an abdomen to be opened and that the puncture ought to be repeated, only an indifferent attention is bestowed to the case; only a very casual asepsis is made of the hands, of the patient's skin, of the instruments, or of the liquids to be injected.

And this is particularly serious; for the liquids remaining for some time in a closed vessel will be under the best of conditions for giving birth to microbes.

### 3. By the technique.

Too many or too few punctures are made; at intervals too short or too long, with liquids too active or not active enough, and that is why the abscess persists indefinitely, or even ends by opening spontaneously.

These are the mistakes which may be made in the course of treatment by puncture.

But the mere fact of my pointing out these faults will help you to avoid them, with a little attention and method.

When all comes to all, remember that the technique is at once *very delicate* and *very simple*.

*Very delicate*, in the sense that it demands minute care and a strict asepsis.

*Very simple*, nevertheless, and each of you, to do it well, will only need to read, and to remember, that which follows.

## THE MATERIAL

The necessary instruments have been put together by Collin, in a small case which every practitioner ought to possess, as it may prove useful, not only for the treatment of external tuberculoses, but also for punctures and injections in any other condition.

1. **The needles.**—The case includes a set of four needles : No. 1, 2, 3, 4.

The needles No. 1 and 2, serve for simple **injection**<sup>1</sup> without preliminary puncture, that is to say, in cases of dry tuberculosis (which we shall deal with further on, see p. 159). These two needles have no side holes : that would be an inconvenience.

<sup>1</sup> The dimensions of the needles of our series, as made by Collin are :

	External diameter	Internal diameter.	Length.
No. 1	85/100 millimetres	65/100	9 centimetres
No. 2	115/100 millimetres	75/100	—
No. 3	155/100 millimetres	110/100	—
No. 4	200/100 millimetres	155/100	—



On principle, you always take the *finest needle*, the No. 1.

It suffices for very fluid liquids (iodoformed ether, iodoform, creosote and oil . . .).

The needle No. 2 is used for liquids which are rather viscid, such as the camphorated naphthol and glycerine.



Fig. 104.—Everything necessary for puncture and injection. Going from left to right : sterilised cotton wool, glycerin, naphthol camphor, Calot case, tincture of iodine, ethyl chloride, Velpeau bandage, cup, iodoform creosote oil, sterilised gauze, and a basin for pus. For gloves, see fig. 108 and 109, p. 125.

The needles **No. 3** and **4** serve for **punctures**, that is to say, in tuberculous suppurations where the injection is always preceded



Fig. 104a.—These are the external diameters (actual size) of the needles.

The No. 1 and 2 serve for injections ; the No. 3 and 4 for punctures.

by a puncture. The needles 3 and 4 have side holes, which is an advantage here.

Use here in the same way, for puncture, the finer needle (the

No. 3): it will protect you most surely against the risk of a fistula.



Fig. 105.—Our instruments. A metal case containing an aspirator, a glass syringe, one or more needles.

A needle smaller than No. 3 might easily be blocked by the more or less clotted contents of an abscess.<sup>1</sup>

<sup>1</sup> Nevertheless, when abscesses are very mature, and contain very fluid pus, the needle No. 2 may suffice; try it.

A larger needle exposes you somewhat to a fistula, I repeat it; and that is why you must use No. 4 only in case of **necessity**, when you have found No. 3, previously tried, to be blocked

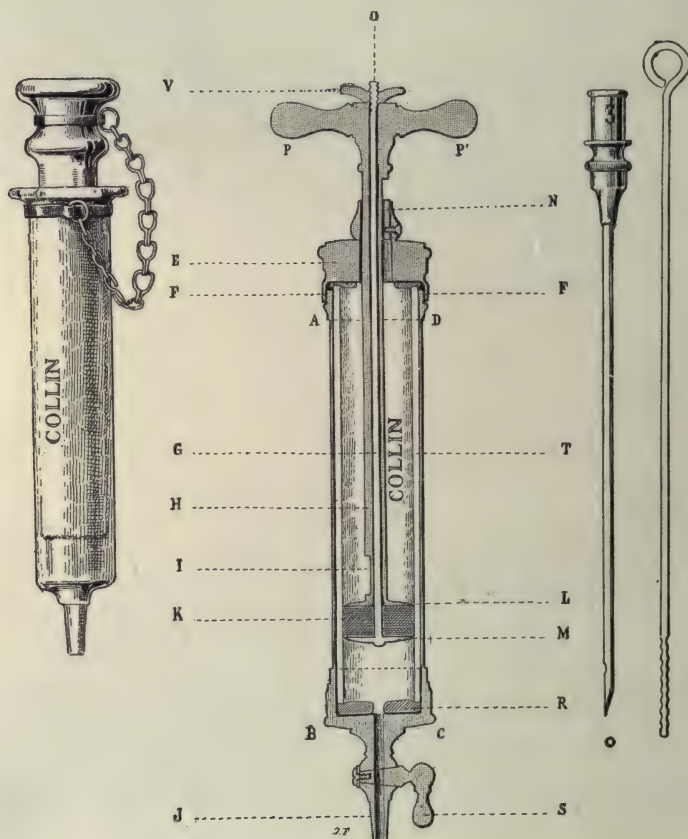


Fig. 106.—Schematic figure (Collin). From left to right: glass syringe, section of the aspirator, needle No. 3 with an o, indicating the internal diameter of the needle, a wire having at its extremity a screw for cleansing the needle.

by the excessively thick contents of the abscess. You might use No. 4 when dealing with an abscess situated far below the surface of the skin (over five or six cm.).



But never, under any pretext, use the higher Nos. 5, 6, 7, which you find in some cases of instruments: you would run a great risk of producing a fistula.

2. **The aspirator.**—Our model (see p. 116) is very easy to regulate, to sterilise and manipulate.

(a) It is **regulated** by means of two screws E and V (fig. 106) at the extremity of the glass tube and at the end of the rod of the piston.

On tightening the thumb nut V which terminates the rod, the asbestos piston K is enlarged, and water-tightness secured.

On tightening the other screw E, you ensure the contact of the glass tube with the two washers of india-rubber placed at its two extremities. (In this way the vacuum is assured.) The screws are loosened when you wish to take the instrument to pieces.

(b) It can be **sterilised** conveniently by simply boiling (thanks to its piston of asbestos which is not affected by immersion in boiling water however much prolonged).

The *capacity* of the aspirator of the ordinary model is only 10 c.c. But this is quite sufficient in practice, because it is easy, in dealing with a large abscess, to empty and refill the aspirator as many times as may be necessary until the evacuation is complete. And, thanks to its small capacity, it has the advantage of allowing one to evacuate the abscess gradually, and without any danger (or scarcely any) of causing the wall of the abscess to bleed, while that danger exists in using aspirators of larger capacity.

This small aspirator, with its 10 c.cm., is almost too large for aspirating certain small abscesses, for example, a broken-down cervical gland; in that case, it would be wise, in order not to draw blood, to open the cock but very little, so as to draw off the pus drop by drop. And as soon as a depression in the skin is produced showing that the walls of the abscess have come in contact, or when the pus issues slightly tinged, you immediately turn the cock of the aspirator.

All you have to do to make the aspirator ready, so as to create a vacuum, is, the cock being closed, to draw the stem of the piston up to the end of the barrel and give it a quarter of a turn, when a notch there allows it to be fixed in that position.

3. **The syringe.**—The glass syringe may easily be boiled ; it is adapted, like the aspirator, to the flange of the needle. Aspirator and syringe could, in case of necessity, supplement each other, but it is necessary to have the two, because, in the first place, one may be taken unawares, and in the second, it is much more simple to aspirate with the aspirator **by reason of its cock, which allows a vacuum** being secured **before** using it. And it is also easier and more natural to inject with the syringe than with an aspirator, especially when an injection has to be made without a preliminary puncture.

Our aspirator being “in order” (the vacuum being perfect) you hold it in the right hand, whilst the left hand holds the needle : the evacuation is made without any traumatism ; on the other hand, when you aspirate with a syringe which it is impossible to exhaust beforehand, you always produce jerks and repeated tractions on the wall of the abscess. The jerks are **painful** to the patient ; they cause slight hæmorrhage ; they interrupt, at every movement, the contact between the needle and the syringe.

You will find, besides, in the Collin case, one washer of asbestos and two reserve india-rubbers (and you might also ask for the addition of a spare glass barrel for the aspirator, which you could easily adapt yourself).

The permeability of the needles is provided for by the addition of a metallic thread (cleaning wire).

The cleaning wire of needles No. 3 and 4 has a screw thread cut at its extremity ; this allows of its acting as a cleaning brush each time it is used.

### The method of sterilising the instruments.

The aspirator and syringe (previously taken to pieces) are placed with the needles in the small metal case. The case, opened, is plunged into a covered fish-kettle full of water, to which has been added some borate of soda, in the proportion of 15 to 20 grammes to the litre (this solution boils at  $220^{\circ}$  to  $222^{\circ}$ ).<sup>1</sup> The water at the moment you plunge the case into it is cold; raise it to boiling point—which should be kept up for from half to three-quarters of an hour.

### Cleansing the instruments.

After each occasion they are used it is necessary to clean the instruments thoroughly.

The grease should be removed first with alcohol and ether. To thoroughly cleanse the needles brush them through with the screw at the end of the wire, already mentioned. After cleansing, boil the instruments again. Afterwards, wipe them with gauze or sterilised wool, or pass them through alcohol or ether, when they will dry spontaneously.

Give the cleansing wires a coating of oil, and insert them into the needles. Replace the whole in the metal case, which must be always kept perfectly clean.

<sup>1</sup> Note this well. It is generally believed that instruments must be put into the water when it is already boiling, as without this precaution they would be tarnished. Well, it is a mistake; we have never seen them tarnished or damaged by placing them in cold water gradually heated to boiling-point; moreover, in the latter way, all risk of breaking the glass barrel of the aspirator, as is likely to happen if you plunge the instrument suddenly into boiling water, is avoided. I must warn you not to pass the steel needles through the naked flame, as it blackens and corrodes them; it detaches the nickle and quickly puts them out of use; and especially because this method of sterilisation is infinitely less certain than prolonged boiling for half an hour.

If you possess platinum needles, you might pass them through the flame without detriment; but these are very expensive (they cost five or six times as much as the needles of nickelled steel. It is then more economical to keep to the latter. If the nickelling is good, if they are well cleansed each time after use, then oiled over, the steel needles can be preserved for an indefinite time, in spite of repeated boilings.



Before each new puncture, boil the instruments again, but this time it may be for five minutes only, if they have been boiled for half an hour after they were last used.

### THE MODIFYING LIQUIDS FOR INJECTIONS

There is an infinity of medicated agents suggested for the local modification of external tuberculoses.

None of these substances are infallible, but there are four or five at least, which are good, with which it is possible to obtain

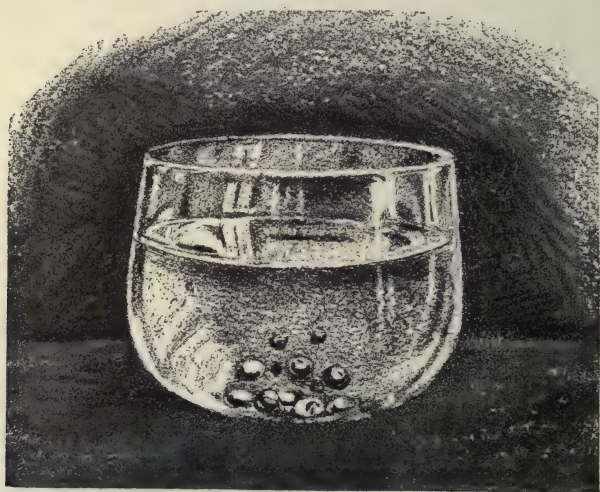


Fig. 107.—The pure camphorated naphthol in water. If you allow a few drops of camphorated naphthol to fall into water, it remains in a state of separated spherules which, if they were introduced into the blood stream, would possibly cause embolism. These spherules are not produced when you throw into water a few drops of the mixture of naphthol and glycerin which has been well shaken.

a cure, provided that *you know how to use them*; for the technique is a more important thing than the nature of the injection, and there are medical men who will never arrive at a cure with liquids of any kind.

I do not mean to say, however, that all these liquids are

equally valuable, far from it, seeing that, after having tried them all, I enjoin you to keep to the two following ones which will suffice for all your needs: (a) iodoformed oil and creosote, and (b) camphorated naphthol with glycerine.

But I have already spoken of them and have given the formula at the beginning of this chapter (see p. 110).

Another word upon the subject of camphorated naphthol with glycerine. Before injecting this mixture, you must make sure that it is miscible with water. You throw a drop into a basin of water and shake it. If the drop of the mixture does not disappear in the water, increase the proportion of glycerin, stir well the new mixture and again perform the control experiment in the water. (Doctor Cayre, of Berck.)

*À propos* of the indications for the two liquids, I would add, that the naphthol camphor should be preferred for an abscess not yet ripe; for example, those large swellings where one withdraws only a few drops of pus, the centre alone being fluid, the rest of the mass being formed of granulations not yet broken down. By injecting naphthol camphor into the small cavity, the abscess ripens; each new injection liquefies successively the several layers of the tuberculosed wall.

And it is for this reason that a few days after injection of naphthol camphor, when making a new puncture, one withdraws a larger quantity of pus than at the first puncture, a larger quantity on the third than at the second, etc.

As soon as the softening appears complete, it is better (as I said before) to continue and complete the treatment with the injection of cresoted oil.

**Iodoformed Ether** is an active and efficacious liquid, but it is not without drawbacks; it *causes pain* and is especially liable to cause separation and sloughing of the skin.

It ought never to be used in cases where the skin is already thin and reddened; it may produce rupture of the skin by the tension it sets up. True, one may let it run out again partly or wholly; but that *mode of procedure* is neither very *precise* nor very *certain*. In fact, one is never certain that there

will not remain, in spite of everything, sufficient ether to distend the skin beyond the limits of its resistance—without mentioning the cases, rare but nevertheless always possible, where the liquid injected does not return at all, or it does not return as much as one would wish. (A parallel disaster to this is sometimes seen to follow injections of tincture of iodine into the tunica vaginalis, in the treatment of hydrocele.)

There are two cases, especially, where you should never employ iodoformed ether :

(a) The first is in suppurating glands in the neck ; with ether you risk seeing the skin give way, and you know the consequence : a hideous and ineffaceable scar !

(b) In the Psoas abscess of Pott's disease, because iodoformed ether may cause a rupture of the sac into the peritoneum or intestine. (I have known of this in several cases.)

But, on the other hand, you may employ iodoformed ether where the skin is quite sound, in the abscess of hip-disease or white swelling, or in an abscess deeply situated in a limb. You might, at any rate, inject a small quantity, 3 or 6 c.c. of iodoformed ether—a twenty per cent. solution.

You will leave it to run out two or three minutes afterwards, but if perchance it does not do so, you need not be alarmed, for the quantity injected is too small to bring about any untoward result. It is for this reason that you will never on principle inject more ether than the smallest quantity you know for certain can be retained.

The tension produced by this quantity of ether is not excessive, and it doubles the certainty of the efficacy of the iodoform injected. The proof that the tension produced by the ether is a factor in the cure is that you are able sometimes to cure with injections of pure ether, without the addition of creosote or iodoform, cold abscesses—essential or symptomatic.

### How do the injections act and how do they cure ?

The problem has been solved in the laboratory of our master, professor Robin, by Coyon, Fiessinger and Laurence.

They have shown that the injections do not act as antiseptics ; no, because of the thickness of the wall, of the intricacy of the cavity, of tuberculous infiltration in the neighbourhood and also of the deep situation of the bacilli. The “ antiseptis ” of tuberculous abscess is as illusory as intestinal antiseptis.

The injections act by provoking a great afflux of white cells, of polynuclear cells, afterwards destroying them, thus setting at liberty certain ferments ; the first is a lipolytic ferment having the property of attacking the fatty envelope of the bacillus, later on, a proteolytic ferment (a protease) having the property of



liquefying and digesting albuminoids, that is to say, of destroying the very substance of Koch's bacillus.

### **The method of sterilising the modifying liquids.**

You may sterilise them yourself, as we are in the habit of doing.

To sterilise the first liquid, the creosote oil, you begin by boiling the oil for half an hour. (If the oil is of good quality, it does not blacken on boiling.) Then you allow it to cool, and add to it the creosote, the gaiacol and the iodoform, all chemically pure, and lastly, you add the ether. For the second liquid (naphthol, camphor and glycerin), you boil the glycerin for twenty minutes (it boils at 302° F.), then allow it to cool, and add to it the desired proportion of 1/6 to 1/7 of naphthol camphor prepared aseptically by your pharmacist, under your direction.

It goes without saying that you will boil the flask and the cups.

Lastly you will take care to preserve the liquids in well-stoppered flasks, keeping them protected from the light.

### **TECHNIQUE OF THE PUNCTURE**

We have to speak here of the technique only. The **diagnosis of cold abscess** and the **study of exploratory puncture** (as a means of diagnosis) will find their place better elsewhere (see chap. XIX).

However, we ought to say, now, a few words on the **indications** for puncture in the treatment of cold abscess.

#### ***The indications for puncture in cold abscess***

##### **(a) Is it necessary to puncture every abscess ?**

Yes, if it is an abscess you are able to reach without the risk of wounding some important organ. Suppose you are in the presence of a deep abscess of the internal iliac fossa ; wait to puncture it until it has become superficial.

**(b) Why puncture the abscess instead of trusting to its spontaneous resorption ?**

1. Because spontaneous resorption is the exception, and by thus waiting, you run the risk of seeing the abscess unexpectedly invading the deep surface of the skin; after which you are no longer certain that you will be able to prevent its rupture and a consequent fistula.

2. Because, in the case where reabsorption has occurred, it required a *very long time* (one or several years).

3. Because when the **abscess has been reabsorbed**, the cure is not **so sure** and not **so definite**, in a general way, as when the abscess has been treated by puncture and injection.

In fact, when we say that a cold abscess is reabsorbed, that means that there is no more liquid, but surely not that all the infected and infecting elements in its wall have disappeared. The cold abscess has perhaps simply returned to its former condition, that of tuberculoma, and at this time, even though there is nothing to be felt on palpation, it may still retain bacilli which are quiescent, **and, in fact, one has often observed the return** of these abscesses so called "**reabsorbed.**"

On the contrary, when the contents of such an abscess and the morbid elements in its wall have been got rid of by successive punctures,<sup>1</sup> one can conceive, and clinical observation confirms it, that the cure obtained will be more complete.

4. A last reason for employing punctures and injections in a Psoas abscess is, that the liquid injected does not act only on the abscess to be cured, but it reaches the bone and the articulation which have caused the abscess, rendering them sound and cicatrising them. So much so that it may be said in all truth that the patients, provided that we treat them by puncture

<sup>1</sup> We are in the habit of saying, at the familiar causeries in our practice, that it is better to see an abscess in a receiver than trust to its absorption into the tissues.

However, when the general condition of the patient is very bad, one ought to wait a while; in the meantime, do nothing more than is absolutely necessary in the way of local treatment, to prevent the opening of large abscesses. In such a case, endeavour in every way to improve the general condition of the patient. But we shall see about that in the chapter on multiple tuberculoses (chap. XX).

and injection, will be cured more quickly and surely than if they had not had an abscess.

### When ought one to puncture?

Immediately the abscess is recognised (except in the case already cited of a deep iliac abscess or a retropharyngeal abscess). It is necessary to begin before the skin has been invaded, before



Fig. 108.



Fig. 109.

Fig. 108 and 109.—Mittens made at the time of the operation with sterilised compresses, for the case where you have touched septic matter.

Fig. 108.—The method of making a mitten. Fold a compress into two, lay the hand flat on the square so made, cut the two thicknesses, following the outline, and baste them together or stitch them with the machine, following the dotted line.

Fig. 109.—Afterwards turn them inside out "like a glove" so that the sewing is inside.

it has become reddened or thin. If not, *it will be too late* to save the skin already inoculated, already invaded by tubercles in the abscess wall; <sup>1</sup> you would not be certain of escaping a fistula

<sup>1</sup> In the same way that the skin of the breast may be invaded, after a certain time, by malignant growths of the subjacent gland.



and its terrible consequences. And even when this red and thin skin does not break, it will very likely be puckered and pigmented ; which, in the neck, for example, is always as hideous as a veritable cicatrix.

### The Puncture

The patient is left in bed, or, better still, placed **upon a table**, the region of the abscess well **exposed**.

Have at hand the necessary objects (see fig. 104), the case



Fig. 110.—An opening arranged in a corset of plaster to allow of the puncture of an iliac abscess. At the moment of puncture, the edges of the opening will be covered with sterilised towels, in the way shown in the following figure (fig. 111).

containing the three sterilised instruments, the tincture of iodine, the cup, the two flasks of liquid, and the dressing.

You proceed to make the toilet of your hands and of the area to be punctured, taking as much pains as if you were going to open an abdomen.

(a) **Toilet of the hands.**—Rub the hands for several minutes with a coarse brush in oxygenated water (this is particularly recommended), or wash them thoroughly in warm soapy water; after that, rub them with alcohol and ether and steep them in a warm solution of sublimate, one in a thousand.

It would be better to wear india-rubber gloves. They are indispensable **when you have been touching wounds or matter which is septic.** In default of gloves, postpone the

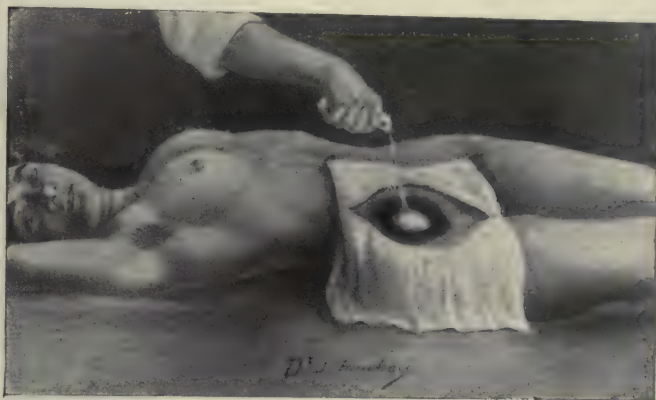


Fig. 111.—Where you see from periphery to centre : (1) the fenestrated compress surrounding the abscess zone ; (2) a dark patch representing the skin painted with iodine, and (3) in the centre of the dark patch, a white area representing the part anaesthetised with ethyl chloride.

puncture until the next day unless there is extreme urgency (for example, in the case of an abscess which is about to open), in which case you might make a puncture, without an injection, after having smeared your fingers with tincture of iodine, or rubbed them well with benzole or iodised alcohol, touching the instruments only with the hands protected by compresses or large squares of gauze well sterilised (by boiling) ; or, better still, with *fourreaux* similar to infants' gloves or "mittens," which have been prepared on the spot, by some one of the family, by stitching two compresses together by three of their edges (see fig. 108 and 109), and afterwards boiling them.

(b) **Asepsis of the patient's skin.**—Asepsis is produced nowadays by simply painting with fresh tincture of iodine, by means of a small brush or a piece of cotton wool (see fig. 111), without previous washing or brushing. I should say, without im-

mediate washing, for a washing done the evening before can only be beneficial.

The tincture of iodine is

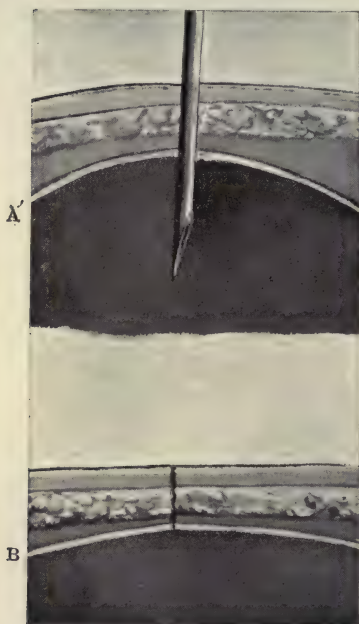


Fig. 112.—How not to puncture, for if you force the needle through the wall perpendicularly, its course through the soft tissues will be very short, the walls of the track would remain patent when the needle is withdrawn; these conditions facilitate the infection of the abscess by pus, which may exude.

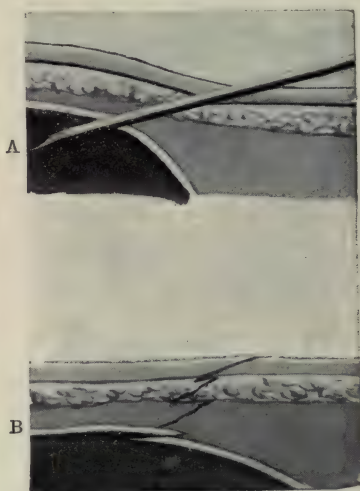


Fig. 113.—How one ought to puncture. The puncture is very oblique; the track is much longer (A); on the other hand, the retraction of the soft tissues does away with the patency of the sides of the track, making it zigzag (B).

allowed to dry for two or three minutes. Paint it widely, that is to say, over a surface as large, at least, as twice the size of the palm of the hand.

The advantage of this extensive painting is to prepare a



place for the contact of the left hand, which has to fix the skin whilst the right hand pushes in the needle. For the same purpose, and as an additional precaution, a large (boiled) compress is applied over the region, an opening being cut out of the centre, leaving uncovered a square of 6 to 8 cm. wide, in the midst of which is the place chosen for the puncture. All the surface of skin left bare should be painted with tincture of iodine.

After the puncture, you remove, with a swab impregnated with alcohol, what remains of the tincture of iodine, for if it is not very fresh it may cause desquamation or even vesication of the skin.

During the five or ten minutes required by the tincture of iodine to dry, you put in order the aspirator, that is to say, you make the vacuum, and you charge the syringe.

If you wait to make the vacuum until the needle has been forced in, you may have the pus spurting out and soiling everything, before the aspirator is ready. The aspirator and syringe are afterwards placed in a dish close at hand.

You use needle No. 3.

**Where must you pierce** the skin? At a point away from any veins which are visible beneath the integuments, and at a distance of three or four cm. from the cutaneous zone of the abscess, in such a way as to enter by an oblique track (instead of pricking the skin vertically and going straight into the abscess).

This obliquity is advantageous for deep abscesses, and indispensable for superficial ones, especially subcutaneous abscesses (fig. 112). Those you should never enter except by a very oblique track, and almost parallel to the skin.

Thanks to this obliquity (fig. 113) the lips of the deep extremity of the needle track will play the part of a valve and



Fig. 114.—The needle is held between the thumb and second finger serving as guide, the first finger pushing on the head (or hold it as you would a trocar or writing pen).

prevent the contents of the abscess from escaping outwardly, as



Fig. 115.—Abscess of the right iliac fossa: the collection forms a thin sheet in the midst of the depressible soft tissues.

the needle is withdrawn. Moreover, in pricking the skin four



Fig. 116.—The abscess in the preceding figure. The sheet of pus very much spread out.

or five centimetres from the cutaneous zone of the abscess, one passes through sound skin; and that is very important.

**Anæsthesia of the skin.**—Upon the place thus selected (fig. 111) ethyl chloride is sprayed.

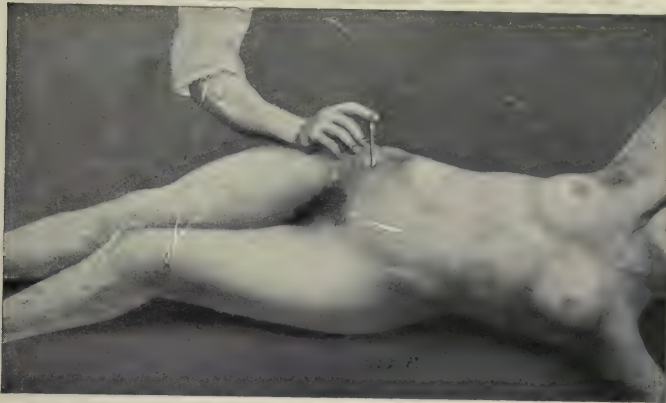


Fig. 117.—When you proceed to puncture the abscess, the needle depresses the skin before it enters the collection. Look at the following figure.

As soon as the skin is blanched over an area the size of a five-shilling piece, take the No. 4 needle in the right hand

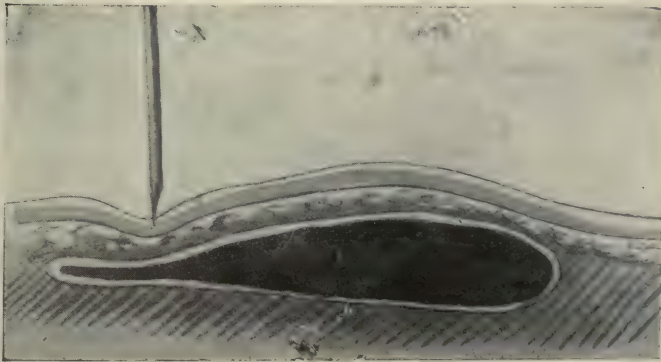


Fig. 118.—The pressure of the needle (see fig. 117) drives aside the pus, of which but a little very thin sheet, remains, liable to be traversed by the needle, without any result. This would be a "ponction blanche" (a failure), although a great quantity of pus is present. The index finger presses firmly on the head, then the skin is fixed by the index finger and the thumb of the left hand.



(fig. 114) and hold it by the middle between the thumb and second finger, whilst the index finger presses firmly on the head ; then



Fig. 119.—What it is necessary to do to puncture the abscess (see the four preceding figures). An assistant presses firmly on its periphery.

the skin is fixed by the index finger and the thumb of the left



Fig. 120.—The assistant in this way (see fig. 119) causes the fluid to flow back to a single point, where it should be easy to attack it with the needle by an oblique puncture.

hand at one or two centimetres from the point chosen for the puncture ; you could, moreover, direct an assistant to push the



Fig. 121.—As soon as anæsthesia is obtained, you stretch the skin with the thumb and index finger of the left hand and thrust the needle with the right hand.



Fig. 122.—In order to adjust the aspirator to the needle, hold the outer end of the latter between the thumb and index finger of the left hand so as to prevent any displacement of the point. This adjustment once assured, the left hand is employed in opening the cock of the aspirator.

abscess towards you, pressing it with one or both hands on the opposite part of the region ; you then plant your needle in the skin, and push with a firm and sustained effort, so that the integuments are traversed.

The congealed skin is sometimes very difficult to pierce, and you need to push firmly ; but it is necessary as soon as the skin has been traversed, to moderate your force, so as to go

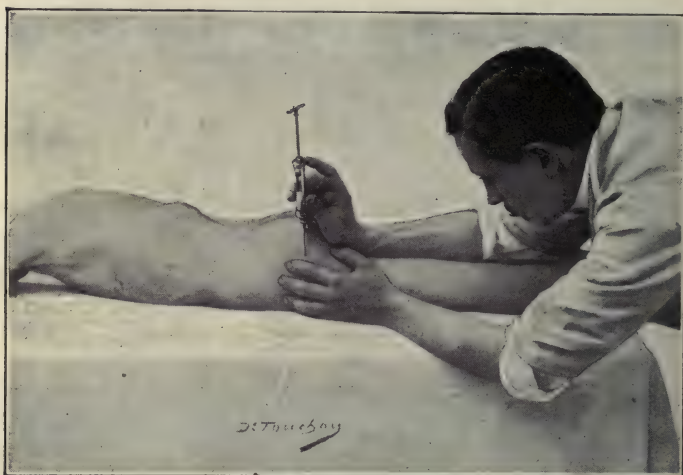


Fig. 123.—After that, still holding the aspirator and the needle in the right hand, the left hand presses gently on the abscess wall.

through the soft tissues gently up to the point where you judge pus will be found.

When you arrive at the wall of the abscess, you usually feel a slight resistance, and you should press a little to get through ; but as soon as you are in the sheet of liquid, all resistance has disappeared ; you have a **special sensation**, which you at once recognise. You feel that the deep extremity of the needle moves about with a certain freedom—which it would not do if it were not in the abscess itself.

Fairly often, a small drop of pus oozes from the end of the



needle. But, generally, the pus does not issue spontaneously; hence the evident necessity for aspiration, which is infinitely preferable, need it be said, to the rough pressure practised by some practitioners over the region of an abscess, to obtain the discharge of pus; traumatic pressure causes bleeding and creates the risk of inoculation—and, moreover, is very often ineffective in bringing about the evacuation.



Fig. 124.—When the aspirator is full, the pus is emptied into a small basin.

You block the needle with the left index finger, while the right hand takes from the basin the aspirator already prepared and then adapt it to the lumen of the needle.

When this adaptation is complete, the left hand opens the valve, the pus immediately fills the aspirator (held in the right hand); you then close the valve and withdraw the aspirator from the needle, which remains in its place. Before removing the aspirator you place and leave a small piece of sterilised cotton wool round the needle, to absorb any drops which may flow while you empty the aspirator.

You empty the aspirator, exhaust it again, and you readapt

it to the needle ; and so on again and again, until the abscess is empty.

One recognises that the abscess is empty by its having collapsed ; and, when it is superficial, by its cutaneous wall being deepened into a hollow, and by there being no longer any appreciable fluctuation.

Is it **necessary** to try and **empty** an abscess **thoroughly** ?

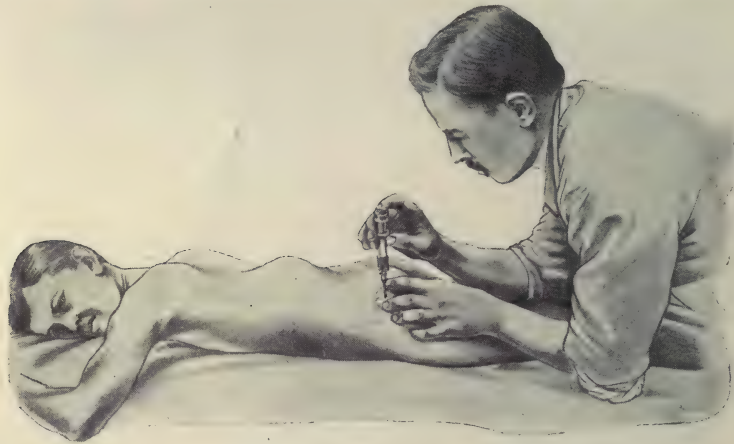


Fig. 125.—Injection. The aspirator is simply replaced by the charged syringe, which is adjusted to the needle.

At the commencement of the treatment, No, so that you do not run the risk of causing the wall to bleed. Later on, after a series of injections, you may empty it thoroughly, because then, if you should withdraw a few drops of blood, that would cause no inconvenience, the pus being sterile at this time.

The abscess being emptied, one avoids irrigating it ; it would be prolonging the operation uselessly, and even running a slight risk of infecting the abscess.

There remains to be done :—

### **The injection.**

For this, you simply replace your aspirator by the syringe already charged, and you push in the injection.

We have already indicated the liquid which should be chosen : nearly always the creosoted oil ; and the quantity which should be injected : for large abscesses, never more than from 10 to 14 c.c. ; and for a small abscess inject less than 10 c.c., using a quantity equal to a half or a third of the quantity of pus withdrawn.

**Withdraw smartly the needle** attached to the syringe.

Immediately, you place over the orifice a **tampon** of wool or a piece of sterilised gauze, and, by a few to-and-fro movements, you do away with the parallelism of the two orifices in the skin and the abscess wall.

Finally, you apply lightly a compressive **dressing**, in place of the simple layer of collodion usually employed, which does not sufficiently guarantee against infection. And do not touch it again for several days, until the second puncture.

**When should the second puncture be made?**

This varies a little, according to the case. It is best made after **about ten days**.

Why this delay ? Because at the end of that time the liquid injected has ceased to act. This rule applies to ordinary cases, where the skin, before you puncture, was in very good condition ; for if the skin were inflamed and attenuated, you would inspect it next day, and every following day, to watch it and guard against all eventualities which we will mention a little further on.

In ordinary cases, where the skin is in good condition (neither reddened nor attenuated) it is useless to examine it before the



Fig. 126.—Abscess of the left popliteal space.



tenth or twelfth day ; at that date, a new puncture is made, followed by an injection. The skin is pierced at a new place on each occasion, so as to avoid all risk of a fistula occurring.



Fig. 127.—Squares of absorbent cotton wool dampened and arranged for the compression of the abscess on the completion of the series of punctures.

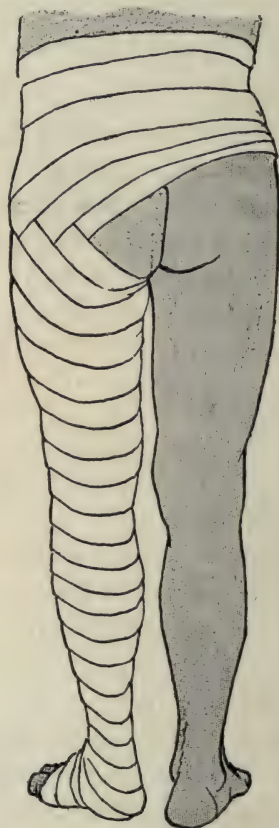


Fig. 128.—Compressive bandage beginning at the toes and reaching far above the abscess for the purpose of causing approximation of the walls of an abscess of the thigh or of the groin.

It is preferable to make the second puncture about the twelfth day than to postpone it indefinitely, relying upon the re-absorption of the abscess, a possible occurrence, after a

single injection. Our reasons are analogous to those which have urged us to puncture rather than abstain, namely, that re-absorption does not often occur, that in waiting one loses time, and supposing a case in which this single injection sufficed, the abscess would not be so well cured as it would be

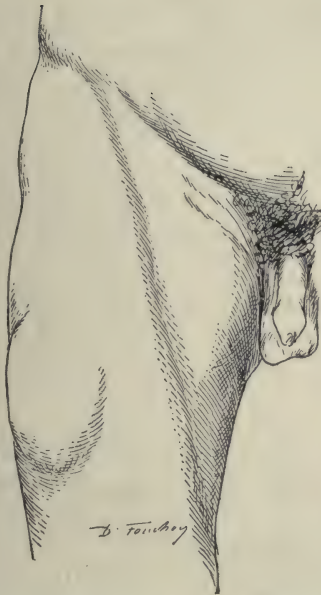


Fig. 129.—Abscess of the external aspect of the thigh.



Fig. 130—The same abscess after puncture and complete evacuation: the globular swelling is replaced by a saucer-like depression.

after 7 or 8 injections. In the same way an abscess treated by injections will be better cured, as we have said, than one in which absorption has occurred spontaneously, without any injection.

As to the length of the intervals between the sittings, I know very well there are all manner of opinions; on the one hand, are practitioners who propose to repeat the operation every three days; on the other hand, there are others who consider the interval should be three months. Well, I consider the truth

lies between the two. If the sittings are repeated too often, there is a risk of the skin becoming thin and of infection—and, beside, it would distress the patient. If they are too



Fig. 131.—This is the end of the 8th and last puncture; this time, instead of a further injection, you apply compression.

When the evacuation is finished, you apply over the abscess a pad of cotton wool moistened and squeezed out; the left hand resting on the pad, the fingers are applied successively the one after the other, commencing at the part furthest removed from the point where the needle entered, causing the last few drops of pus remaining to flow in that direction. The aspirator and needle are then withdrawn together, smartly.

far apart, the cure of the abscess will take a very long time, and a perfect result is not so certain. Therefore, neither too



Fig. 132.—Then over all a flat tampon and, to perfect the compression, some moistened pads of cotton wool placed crosswise over the abscess.

long, nor too short intervals—and the best rule is to make a sitting every 10 or 15 days.

At the seventh puncture, the liquid you withdraw is



# THE DIFFERENT APPEARANCES OF TUBERCULOUS PUS.

THE INDICATIONS TO BE DRAWN FROM THEM WITH REGARD TO TREATMENT AND PROGNOSIS.



A, B, C. *Non-infected pus* : Treatment by puncture and injections.

A. Sero-pus, mahogany colour. } In these cases one should inject iodoformed oil or  
B. Ordinary pus } ether.

C. Clotted pus.—In this case, inject camphorated naphthol.

D. *Sanguineous pus*, without fever, without the odour of pus.—The abscess is not infected, but runs a great risk of becoming so and of bursting. To avoid this twofold danger, punctures must be made as *seldom as possible*, nothing must be injected; slight compression should be made after the punctures. By “seldom as possible,” I mean that you should puncture only if the skin threatens to give way.

E. *Claret-coloured pus*, infected, with fever and the odour of pus.—Treatment: Try to reduce infection and fever by puncturing every day without injection afterwards. If after 15 or 20 days fever persists in spite of the punctures, resign yourselves to incising and draining the abscess.

[To face page 140.]



no longer pus, but a mixture of brownish serosity and of

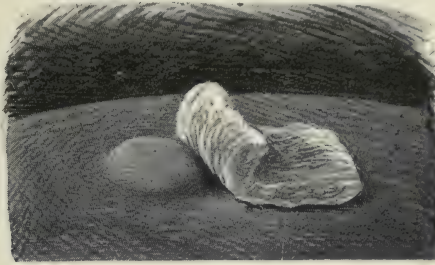


Fig. 133.—Two or three weeks after, you remove the compress and make an inspection. If, as shown here (but it is an exception) a small quantity of pus still appears, it is collected at a single point instead of being distributed over the whole wall of the abscess. Puncture at this point without removing the pad of wool, which should remain in position after the puncture, and over it replace the tampons crosswise so as to renew the compression which should be maintained evenly for three weeks.

modifying liquid sometimes slightly tinted of a rose colour.



Fig. 134.—The arrangement of the moistened tampons for compression of the culs-de-sac at the elbow.

Very often also, at this time, one notices in the contents of the abscess, some of the **liquid injected, unaltered.**<sup>1</sup>

<sup>1</sup> The bacteriologists explain this (see p. 122), by saying that at the **beginning**, as a result of the first injections, a **lipolytic ferment** is formed.



If, after seven punctures and injections, liquid is again formed, which is the rule, you will make an eighth puncture, but this time **without injection**.

And you will at once **compress** the region with pads of wool placed crosswise, and Velpeau bandages, to promote the **approximation** of the abscess wall, from that time sound and secure (fig. 131, 132, 133, 134, 135).

This compression you maintain, and even if possible increase, by adding every four days one or two Velpeau bandages over the compressive dressing (without undoing it).

This dressing remains in place for from 15 to 20 days.

When you eventually remove it, approximation of the walls of the pocket has been effected ; the abscess is cured.

Nine times out of ten this will be the course of events ; very regularly, without incident, without a slip.

The tenth time, certain complications may arise which would disconcert you perhaps, if you were not forewarned ; but you may easily overcome them, after having read that which follows.

### Possible accidents in the course of punctures and injections.

#### A.—IMMEDIATE ACCIDENTS.

We will particularise these : wounding of arteries, with the means of avoiding it ; what should be done in case the puncture proves negative ; when it causes bleeding ; when the cutaneous orifice is obstructed by granulation tissue, after the needle is withdrawn ; the course to adopt when the patient comes to you, the skin being already inflamed and attenuated, ready to give way.

#### 1. Wounding of vessels.

Abscesses are sometimes found embracing veins or arteries of having the property of **digesting fatty matter** (such as the oil of our injections) ; a little **later** a **proteolytic ferment** appears, which digests albumenoid substances, but **leaves intact the oil** in our solution.



Fig. 135.—Compression of the cul-de-sac of the ankle.



Fig. 136.—To avoid the vessels, they are marked out by the index and second fingers of one hand and pushed on one side, while the other hand pushes in the needle two centimetres outside them.

some size ; how do you avoid wounding those vessels ? It will be very simple—after you have cast your eyes over the figures opposite and read their descriptions (fig. 137, 138, 139, 140).



Fig. 137.

Fig. 137.—How to protect the vessels in the case of a small abscess lying over them (in the fold of the groin).



Fig. 138.

Fig. 138.—The abscess is pushed aside by pressure of the finger. The needle pushed in at an angle, does not risk injuring the vein.

## 2. The puncture is negative (no pus flows).

The needle is introduced, aspiration is made, nothing appears.

Why ? (a) It may be due to the **faulty working of the aspirator**. Make sure that you have really made a vacuum by drawing into the instrument a little boiled water from a



Fig. 139.

Fig. 139.—An abscess situated behind the vessels.



Fig. 140.

Fig. 140.—A finger is pressed firmly on the skin at the inner side of the vein in the direction of the arrow. The abscess is made to protrude on the outer side of the artery : a second finger protects the artery during the puncture.

basin. If a vacuum has not been produced, you should tighten the two screws which serve to regulate it, and aspirate again.

But the pus still does not flow.

Look for another cause.

(b) **Are you certain you are in the abscess ?** neither to one side nor to the other of it ? In order to know this, you proceed,



whilst an assistant holds the aspirator, to make a fresh palpation of the neighbourhood, and ascertain if the site of the abscess corresponds exactly with the point of the needle.

When in doubt, push in or withdraw a little the needle coupled on to the aspirator, moving the point about in the neighbouring parts.

But if the pus will not flow at all, it is because :

(c) **Your needle is blocked.**

Generally one feels at once that the needle *must* be blocked : because one has the sensation, very plainly, of penetrating into a layer of liquid, or because one has already withdrawn a little of the liquid, when all at once the flow is stopped—in spite of the fact that one feels quite sure that the abscess is not yet empty.

What can you do to **clear the needle** ?

There are practitioners who would, even in this case, press very firmly on the abscess, to evacuate the engaged clot : a **bad manœuvre** which would cause bleeding and bring about inoculations—the least inconvenience of such method being that it is nearly always useless.

You must, **on the contrary, drive back the clot** into the abscess. To do that, you replace the aspirator by the syringe, and force vigorously into the needle 5 or 6 gr. of creosote oil with iodoform, or, better still, of sterilised water ; after that withdraw the syringe and replace the aspirator, and you will see the flow return.

If the needle become blocked a second time, you might force in a new injection or introduce into the mouth of the needle the metallic brush( fig. 106), of which the length is calculated so as not to pass beyond a few millimetres of the extremity of the needle.

If it is constantly being blocked, **do not give it up** ; do not be despondent, and, above all, **do not imitate** those impatient surgeons who immediately cut into the abscess, which “refuses” to be emptied.

Too often, this fault, committed with a light heart, would

be irreparable : the fistula produced **would never close**. No. Content yourself with **injecting** 3 to 6 gr. of **naphthol-camphor with glycerine**, then remove your needle, putting off the puncture for three or four days.

During these few days the naphthol-camphor will have had time to soften the abscess contents ; this time you will obtain pus. If, for some extraordinary reason, you still do not obtain it, you should again inject naphthol, which will at last produce a liquid capable of being evacuated, if not by needle No. 3, then by needle No. 4, which you would be justified in using under the circumstances.

### 3. There is bleeding.

You draw blood with your needle as soon as it is introduced.

(a) If it is at the **commencement** of the puncture and there are merely a **few rosy streaks** in the midst of the liquid, that is nothing ; **continue** to aspirate without fear, and you will notice that at the second aspiration, no more blood is obtained, but only pus.

(b) On the other hand, if **immediately** the needle is introduced, a jet of blood escapes, you may be certain that you have struck some small vessel in the wall of the abscess or in the surrounding soft parts : it will be better to **withdraw** your **needle at once**, then apply **pressure** for a few minutes with a large swab kept in position by the hand, after which you apply a compressive dressing, postponing the puncture and injection until the next day or the day after, unless it is necessary to empty the abscess immediately, in which case you will puncture again, choosing another place for the introduction of the needle.

(c) **At the end of the puncture**, after having emptied the abscess, if you see that the pus is slightly tinged with blood, the evacuation **is sufficient**. Make haste to withdraw the aspirator, push in the injection, and withdraw the needle. Here again, you apply pressure for several minutes, then you apply the compressive dressing.

In all cases where the abscess has shown traces of blood, do not be surprised at obtaining at the following puncture, some blackish or grayish-brown fluid; it is only a mixture of pus and altered blood.

But now and then at the time of the puncture you withdraw a liquid of reddish or chocolate colour, sometimes blackish,

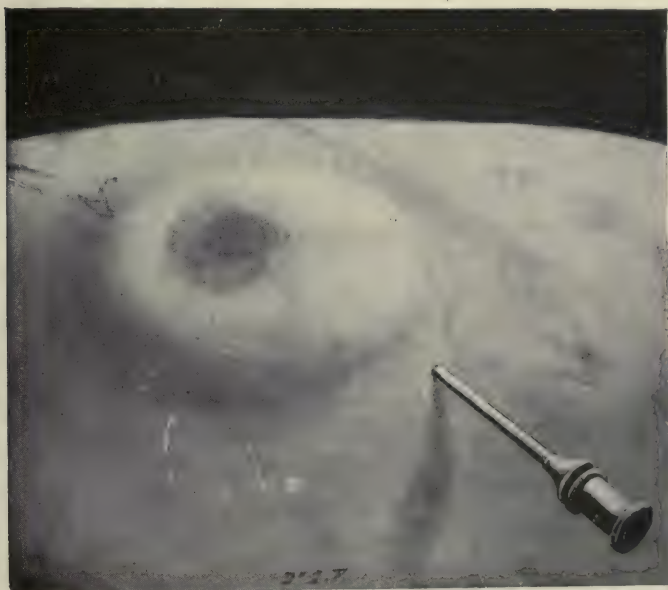


Fig. 141.—The skin is thin and inflamed at one point. You will puncture by entering the needle well away from the cutaneous zone of the abscess.

which is blood more or less altered. You know that this is from the pocket of a cold abscess (and not from a simple traumatic hematoma), by its situation near an articulation or near a bone certainly tuberculous.

It will be necessary to empty the abscess but without injecting anything at once, and to apply a firm dressing; after that you will wait 4 or 5 weeks, and even longer if possible,



that is, as long as the condition of the skin will permit, before again performing a puncture.

4. **The cutaneous orifice is obstructed** after removing the needle, by **a drop of pus or some granulation debris**.

After having withdrawn the needle, you may see a drop of pus, or some caseous particles or other debris from the abscess wall, appear in the opening. You should **remove the debris** with a swab and wash the part with great care, so as to avoid all possible inoculation of the skin.

After all, this little incident rarely occurs if you use only a fine needle, No. 3, for puncture, and if you only approach the abscess by a long and oblique track, and finally if, in the case of aspiration without injection, you take great care to close the valve before withdrawing the needle while joined on to the aspirator; if you do not, the vacuum still remaining will draw the clots up to the orifice in the skin.

5. **Accidents arising from the bad condition of the skin when the patient is first seen.**

The skin is **reddened** and **thinned** when **first seen**, this means that the deep surface of the skin is already inoculated and invaded by the tuberculosed wall of the abscess.

Can you save the skin? Yes and no.

It is not *always possible*, and it is on account of this that it is not permissible for the practitioner who has the patient under observation from the outset, before any alteration in the skin has occurred, and who has the choice of the moment for intervening—it is not permissible, I say, to postpone the first puncture beyond a few days.

But if nothing is neglected the skin **can** oftentimes, even as a rule, be **saved**. At any rate, this saving of the skin must always be attempted; the first condition in order to attain this object, is to desire it. Now, most of those who are in favour of puncture and injection believe as soon as they see the skin already red and thin, that the battle is lost beforehand; they will not even attempt a struggle. Worse still, they at

once take the knife and freely open the abscess, judging that a surgical opening is better than a spontaneous opening. Foolish policy.

This is quite wrong; there is no reason ever to despair of saving the skin, even when most compromised; especially is it never advisable to use the knife; it is ten times preferable to fold one's arms: if you do not touch the skin at all, it preserves at least a slight chance of saving itself.

Unhappily, as to this, practitioners are very difficult to convince, I repeat it, and it frequently happens that they, who say that they accept the method of puncture, open cold abscesses or tuberculous collections, judging that "in this particular case (?)," which they have under observation, the skin is already too attenuated and too inflamed to allow of their abiding strictly to the rule.

Nay, this rule does not admit of exception. One must always endeavour to save the integument, and one will often be successful.

We have cited a number of facts in support of that which we advance here (see my book *Les maladies qu'on soigne à Berck*, p. 120).

### How to save skin which is compromised.

There are two indications to fulfil:

The first is to **do away with all tension** of the skin which is attenuated and offers very little resistance, and, for that, to puncture the abscess every day; the second is to prevent the march of invasion of the tuberculosis, which calls for **injections**.

But are not the two indications contradictory? If injections are made, secretion by the wall of the abscess is encouraged and the abscess refills; but without injections, the tuberculosis is not arrested in its march, it will finish by destroying the skin.

What is to be done? There is an alternative.

It is to puncture the abscess every day, or every other day and then to inject only a very small quantity of iodoform

creosote and oil ;  $\frac{1}{2}$  to 1 c.c. for small abscesses, 3 to 4 gr. for large ones. Thus, you inject sufficient liquid to modify the granulations on the deep surface of the skin, but not enough to excite a hyper-secretion from the abscess wall, which would still further lessen the vitality of the skin.

In such a case do not neglect, especially if dealing with an extensive abscess, to place the patient in such a position that the inflamed part of the skin is uppermost ; when necessary make the patient lie face downwards, maybe for several days and several nights. He soon becomes accustomed to this position, which gives us, in many cases, the best results in trying to save a skin ready to give way.

And so soon as the skin has been undoubtedly saved, return to the ordinary treatment of the abscess by puncture and injection, going up to a series of seven injections, the regulation number.

#### B.—COMPLICATION FOLLOWING ONE OR SEVERAL PUNCTURES.

There is the skin, the resistance of which becomes lessened in spite of, or even on account of, treatment. There is the abscess which does not dry up, or which becomes infected, or which bursts open, in spite of everything.

(a) The **skin becomes red and thin** after one or several sittings. One has established that after each puncture and injection the abscess refills, and before long the increased tension in the abscess creates a danger to the skin. This hyper-secretion from the wall is due to an excessive reaction caused by the injections. Discontinue them, then, for a while, but continue the punctures, without waiting for the 10 to 12 days' interval (see p. 140).

Re-puncture, were it the day after the preceding puncture, and puncture again every day (without injecting anything) until the red and thin skin has recovered its resistance and its normal colour.

At this moment you start the injections again, if the patient



has not had the regulation number, but taking care this time that you inject only half or a third of the dose used before, or make only one injection to two or three punctures.

**(b) The abscess is not reduced in size.**

After having continued the punctures and injections for two or three months, the abscess continues as large as at the commencement of the treatment.

This persistence of the abscess is due, most often, to the fact that **too many** or **not enough** injections have been given. It is to avoid this double stumbling-block that it is necessary to go up to the number of 7 or 8 injections, but not to exceed that. If it is a mistake to keep to one or two injections, it is a mistake also to continue the injections as long as the abscess reappears; it may happen that, for a few days after the injection, the liquid does not reform, that is the exception; **most often, the liquid reforms as long as you continue the injections.**

Yes, even after the wall of the abscess has been thoroughly cleansed, a fresh injection of the modifying liquid, always a little irritating, sets up a secretion of serum from the wall—amicrobic—a secretion which may persist indefinitely, if injections are continued indefinitely.

The injections should be discontinued after the seventh or eighth, and from that time make only one puncture *without injecting*, then a compression in the manner described, to effect the approximation of the refreshed wall.

If, after two or three weeks' compression, fluctuation can still be felt, puncture again and recommence compression and continue thus for three weeks longer.

At the end of that time, examine again. If the abscess persists with the same volume (or practically the same), empty it again and make compression again for a third period of like duration. The abscess should now be dried up. If it is not so it is, in this particular case, because the wall of the abscess has not been sufficiently modified by the regulation number of injections.

Then you must begin again a treatment according to rule, that is a second series of seven punctures and injections—after which, a last puncture without injection and with compression. But not oftener than once in ten times will you be obliged to make thus a second series of punctures and injections, and not oftener than once or twice in a hundred, a third series. On the condition, however, that the general state of the patient is not too bad, and that the local treatment of the causal lesion of the abscess by gravitation is not too defective. For, one or the other of these causes may, in fact, hinder the cure of the abscess.

Thus, for example, you may have followed an unimpeachable local treatment of the abscess, the abscess, nevertheless, goes on for ever, if the patient be cachectic, or presents multiple tuberculous foci.

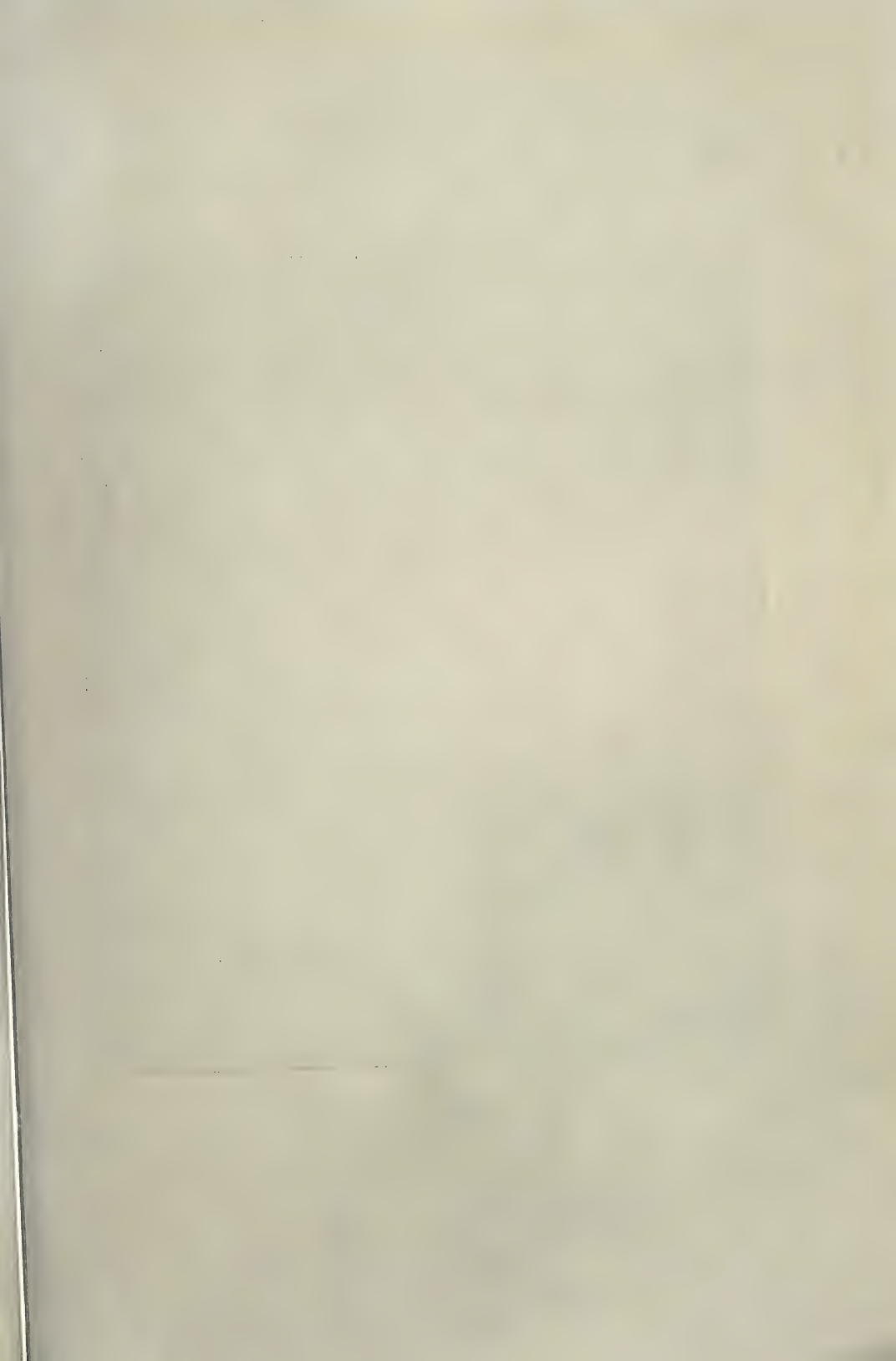
Or again, if you do not look well after the **original condition** which has caused the abscess (hip disease, Pott's disease, white swelling); if, for example, you do not put those patients into a position of absolute repose, if you allow them to walk about, and if you do not immobilise them with good apparatus, a Psoas abscess runs a grave risk of never drying up.

And this can be seen in certain cervical adenites; the abscesses persist as long as the bad condition of the mouth and of the tributary territories of the glands causing the abscess continues.

And from that the treatment can be guessed. It is to **suppress the causes** which are producing the suppuration, to seek for every means that will ameliorate the general condition of the patient, to prevent walking, to immobilise him with a good plaster, to remove teeth which are decidedly bad or not absolutely sound, etc.

**(c) Infection of the abscess occurring in the course of treatment.**

May we hope that after our numerous admonitions, no one will ever make a mistake in asepsis in the course of puncture and injection, and that he will always know how to avoid infection of the abscess.





COLD ABSCESS ON THE POINT OF BURSTING.

HOW THE SKIN MAY BE SAVED.



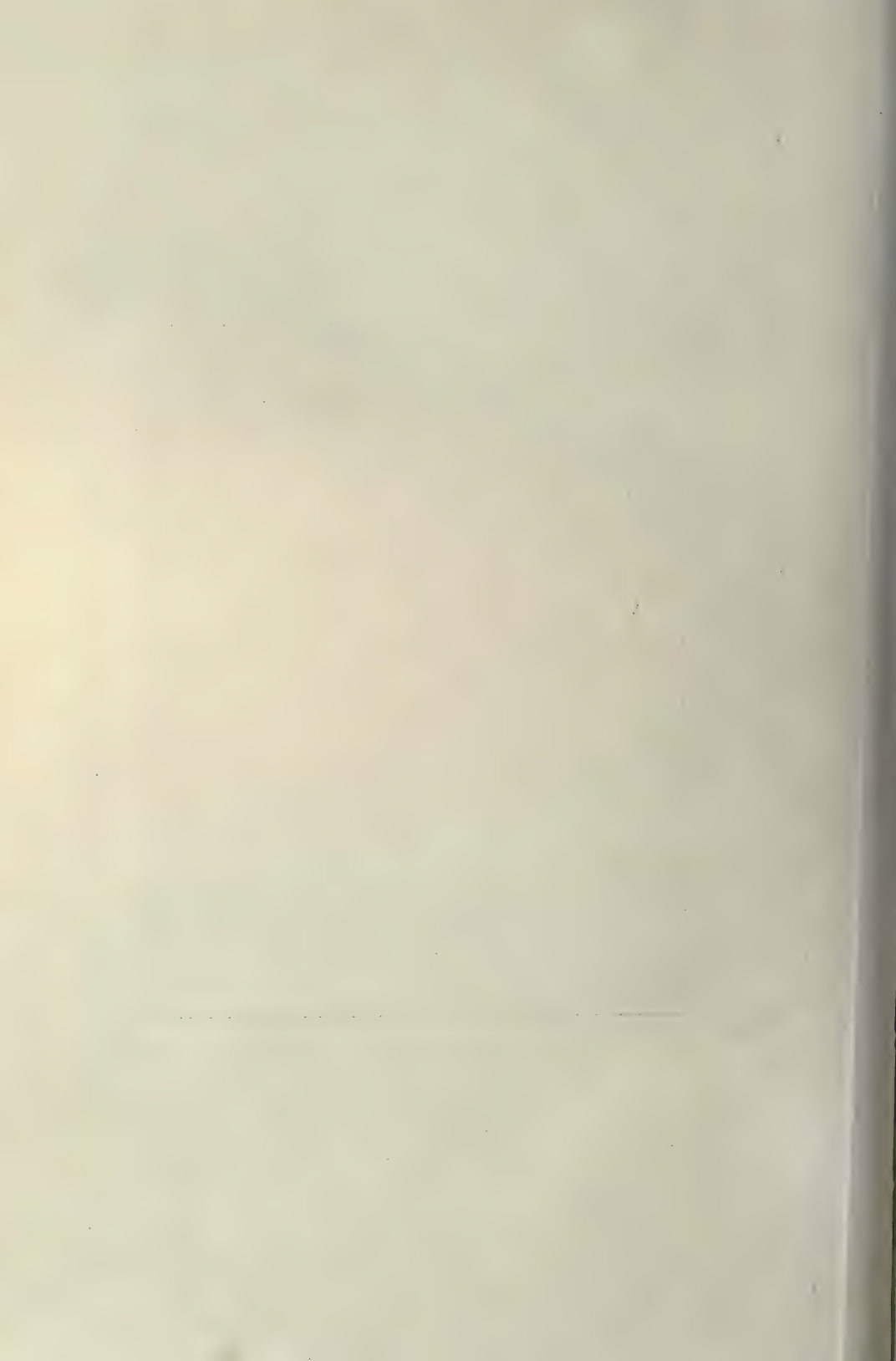
On her arrival at Berek this girl had a cold abscess ready to burst; skin already red and very thin. In order to save the skin punctures were made every day, or every other day, without injection afterwards, for two weeks. On the fifteenth day the skin was saved—see the next Plate.

COLD ABSCESS THREATENING THE SKIN.

*Vide* PRECEDING PLATE.



The same child as in Plate II. after fifteen days' treatment—almost daily puncture without injection. The skin is saved and has regained its normal colour. From this time punctures and injections were made—the ordinary treatment for cold abscess.





Alas, no ! *Errare humanum est !*

It is necessary then to give here a sketch, a symptomatic table (to which we shall return), of unforeseen septic infection.

The most important sign of infection is the appearance of **evening fever** with marked **morning remission**. And this fever is accompanied by the general phenomena with which we are familiar : loss of appetite, rapid wasting, insomnia.

There are also local changes in the abscess and in the parts around.

These local changes present themselves under two different aspects :

(1) Sometimes, they present a rapid transformation from a cold abscess to an acute phlegmon ; there appear redness, heat, local swelling, and pain, either spontaneous or on pressure. Before long, the inflamed skin tends to ulcerate and give way at a point whence issues a thick, phlegmonous, viscid, microbe-laden pus, which must not be mistaken for the non-microbic pus of an abscess produced by our solvent injections, or by oil of turpentine when one wishes to produce a local abscess. Here are the means of making a diagnosis ; in the aseptic abscess, the temperature falls under the effect of repeated punctures not followed by injections, in the septic abscess the temperature does not yield until after the opening and draining of the abscess.

(2) The other case is where there are little or no appreciable changes in the skin : it applies generally to deep abscesses ; at the same time, the general phenomena predominate, but the contents of the abscess has changed ; it is no longer true pus, but a *sanguinolent* liquid, the colour of *tomato* or of *wine lees* ; it contains sometimes gaseous bubbles and often exhales a fetid odour.

*Treatment*.—One endeavours, by means of daily punctures (without injection), to make the temperature fall. If the infection is very slight, one may succeed. It is rare, but I have seen it happen ; then, attempt it.

If, **in spite of punctures** made nearly every day for a certain time—fifteen days, for example—**fever persist** ; if moreover you are certain that the fever is not to be attributed to any intercurrent malady or to a visceral localisation of

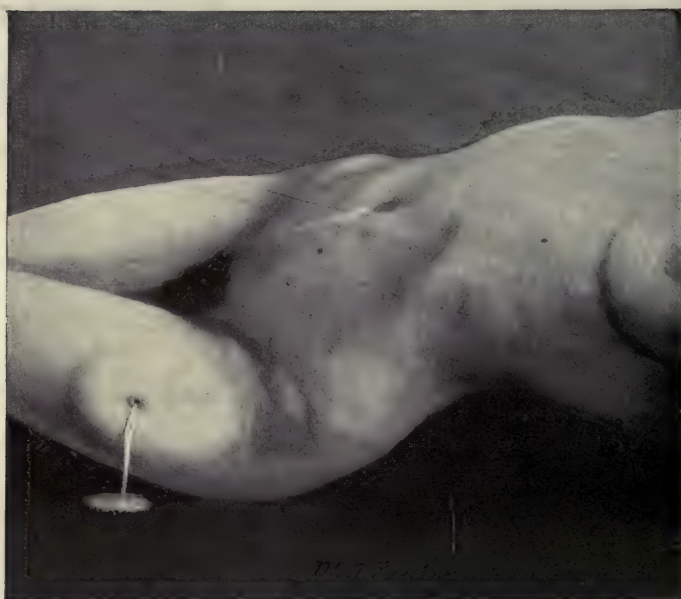


Fig. 142.—The skin very much stretched by pus, causing it to give way at a point.

tuberculosis, then recognise that you have no alternative but to open the abscess. Accept the inevitable.

You must know also that you should not delay the opening, for if you wait too long, the liver and the kidneys run the risk of becoming infected, and that **visceral infection** will be capable, later on, of spreading on its own account, even after the abscess has been opened.

Therefore, if after 15 or 20 days the phenomena of infection and fever have not disappeared, resign yourself, **open the**

**abscess and drain it well.** And you will proceed afterwards as you would in dealing with an infected fistula.

Are there not abscesses **infected from the very outset**, infected before having been interfered with?

Yes, but exceptionally, in the two following cases:

*First case.*—That of an iliac or lumbar **abscess of Pott's disease**, which may, strictly speaking, be infected at the outset by the contiguity of the intestine, ulcerated or not.



Fig. 143.—The abscess discharging by a large opening. A patch of skin has given way.

This may happen perhaps once in a hundred times, and even here, in these abscesses, the infection, when it exists, comes, 99 times out of a 100, from without, from a fault in the asepsis, or from a fissure in the skin.

The signs of infection and its treatment are the same as those given above.

*Second case.*—This relates to suppurative **adenitis** in the **neck**.

When there are bad teeth, erosions of the pharynx, or of the ears, or of the nose, or of other tributary territories of the



cervical glands, one cannot be sure of being able to prevent, with certainty, the rupture of the skin near a tuberculous abscess, because then, in many cases, it is no longer a question of tuberculous abscesses, but of abscesses infected, little or much, by septic germs coming from without.

Therefore, here again, make some reservations as to the chances of saving the skin, if you have found ulcerations of the pharynx, teeth bad or not absolutely sound, etc. The infection may be then grave enough to lead to a bursting of the skin, and at the same time, not sufficiently so to cause fever, or, at least, a fever of more than a few tenths of a degree.

#### (d) Spontaneous opening of the abscess.

We have already mentioned the case where the rupture of the skin was threatening. Imagine a case, still more unfavourable, where the opening has been produced at the moment of the patient's arrival, or a little before, or even before your eyes in the course <sup>1</sup> of treatment, after one or several injections.

What is to be done ?

Here again, try and **retrieve** the condition of things. Instead of enlarging the opening, as alas ! so many surgeons do, you should do everything possible to close it—and you will generally succeed.

You will succeed, especially when the opening has not taken place until after a certain number of injections, because then the deep part of the abscess has had a good chance of being so modified and refreshed that the cicatrisation may be brought

<sup>1</sup> For, in fact, it may happen (and though the case be rare, I ought to mention it) that, in such patient, even when seen in time, **with skin still sound**, even treated regularly, and without there having been **any fault committed in the technique**, it may happen that the tuberculosis is, in this case, particularly malignant, that it has been impossible to arrest its progress towards the skin, and that the skin gives way ; the abscess is open, a small fistula has been produced. But, be re-assured, such evil cases of tuberculosis so malignant are scarcely ever met with, say once or twice in a hundred cases.

It still remains true that with good general treatment and punctures well performed, you may promise a cure of abscesses "without a hitch."

about regularly and quickly, from the deepest part to the periphery (the small superficial wound being, in this case, no longer nurtured by the abscess). The chances of success are decreased, one can understand, if no injections have yet been made, but you may still succeed here very often.

How ?

By simple methods :

This, for tuberculous sores ; daily dressings, thoroughly aseptic, or applications of various topical remedies, tincture of iodine, hydrogen peroxide, permanganate of potash, naphthalan, Championnière powder, our own powder, a drop of lactic acid, iodoformed oil and creosote, Vigo plaster, néol, etc.

Take care to change the remedy nearly every day, for 2 or 3 weeks.

Here is the formula of our powder—

Aristol . . . . .	40 grammes.
Subnitrate of Bismuth . . . . .	100 „
Grey Quinine, pulverised . . . . .	300 „
Siamese Benzoin, pulverised . . . . .	300 „
Carbonate of Magnesia . . . . .	300 „
Oil of Eucalyptus . . . . .	30 „

After 2 or 3 weeks :—

Either cicatrisation has been accomplished, in which case, if the abscess is no longer perceptible, the treatment is finished. If the abscess persist, you will treat it by punctures and injections, after having waited a few days longer, to give the skin time to strengthen itself.

Or else cicatrisation has not occurred, nor anything like it, that is the small wound is kept open by a persistent abscess ; it can be closed only by dealing directly with the abscess. For this, one makes in the track and in the cavity of the abscess, some modifying injections, either in liquid form, or in the form of paste.

The medicated agents are the same as for the treatment of a cold abscess.

If injections of creosote, of iodoform, of naphthol camphor with glycerine, cure the tuberculogenous wall of a closed cold abscess, is it not logical to demand of those injections the cure of the tuberculogenous wall of open abscesses, of cavities, or of fistulous tracks ? The anatomical and bacteriological constitution of the wall is identical in both cases, so long as they have

not been penetrated through the open orifice by septic germs entering from the exterior.

Nevertheless, even when not infected, the open abscess is not in the same condition as the closed abscess; its cure is not so easy, for two reasons:

The first is that the open abscess constantly runs the risk of infection.

The second is that the injected liquid being not retained, returns immediately—without having time to modify the wall of the abscess. Compare with this case that of a closed abscess, where the injection is acting day and night, for several weeks.

Fortunately, we are able to put an end to this double difficulty:

1. By means of a very *severe asepsis*, we can prevent, at least for a certain time, the entry of septic germs from without.

2. In the second place, the modifying liquid may be retained in the sinus and in the cavity. This result is obtained by closing the orifice (immediately the injection has been pushed in) by means of a conical **swab** of sterilised wool **introduced into** the opening, or, more simply, by a **small tampon** (of wool) **applied over it**, and pressing on the cutaneous lips of the fistula—the swab or tampon being held afterwards by a few turns of Velpeau bandage.

3. If you do not succeed in keeping the liquid in its place by this method, there still remains the employment of the **same medicaments in the form of paste**.

These pastes are liquefied (by warming to 110° or 122°F.) a short time before injection, and they solidify at the temperature of the body very soon after being injected.

We will return to the details of this technique a little further on, *à propos* the treatment of fistulæ not infected (see p. 165 and following).

The cure of the cavity of the abscess and of the sinus will lead to that of the small cutaneous fistula which they keep up, and cure is the rule in the recent fistulæ of which we are now speaking,



occurring in the course of treatment (by punctures); for there is here as yet no infection or hardening of the track.

The cure is, consequently, much easier to obtain than in old fistulæ.

## II

### THE TECHNIQUE OF INJECTIONS IN THE DRY OR PULPY TUBERCULOSES

We will describe elsewhere, in the chapters devoted to *cervical adenitis*, *epididymitis*, *white swellings*, *osteitis*, etc., that is, à propos of each dry or pulpy tuberculosis, in which cases the injections ought to be made.

Here, we will only describe the technique of the treatment.

#### A. Instruments required.

(a) The syringe, of ordinary glass (see p. 116).

(b) Needles Nos. 1 and 2; No. 1 for very fluid liquid, No. 2 for viscid liquids.



Fig. 144.—Needle No. 1.

Fig. 145.—Needle No. 2.

#### B. The liquids to be used.

These are the same, in a general way, as for cold abscess, namely:

(a) The mixture of creosote, oil, and iodoform, which is “hardening” in its action.

(b) The mixture of naphthol, camphor and glycerine, which is “softening.”

Very much the same doses are used here as in the treatment of cold abscess.

There is another softening agent, 5 or 6 times as active as the naphthol camphor and glycerine ; it is a mixture of equal parts of the four following liquids : sulphuricinated phenol, camphorated phenol, camphorated naphthol, spirit of turpentine. We will describe the indications a little further on, p. 163.

### The Technique

One endeavours to effect, either *the hardening* of the granulations, or their *softening* (after which one will puncture them).<sup>1</sup>

(a) *To produce hardening*, inject the mixture of oil, creosote and iodoform (the dose from 2 to 8 gr. according as the patient be infant or adult) ; make the injection in the centre of the pulpy mass, and, in the case of arthritis into the joint cavity itself.

Repeat the injections every six or seven days up to a maximum of 10 injections.

Then, compress the region with pads of cotton wool kept in position by Velpeau bandages.

Note that the hardening looked for is not produced either during the period of the injections, nor immediately afterwards. *On the contrary*, the injected parts *swell* during that time ; this *you must warn the parents of*.

It is not for three or four weeks after the tenth or last injection, that the granulations commence to diminish ; and it is only 3 or 5 months after ceasing the injections that you will observe the disappearance of the tuberculous masses.

(b) *To obtain softening*.—Inject the mixture of naphthol

<sup>1</sup> This idea of the softening of hard tuberculouses, for their subsequent puncture, appears now quite natural. But when we first proposed it some twenty years ago, anathema was thrown at us. Just think : "To want to cause tuberculouses to suppurate ! Was there ever anything so monstrous ?" To-day, my former opponents, and their pupils, constantly apply my method and describe it . . . forgetting of course to mention my name.

camphor and glycerine, using from 3 to 8 grammes according to the age of the patient.

In this particular case, the injection should be repeated *every day* until the softening has begun.

It is on the *fourteenth or fifteenth* day (after 4 or 5 or 6 injections) that you begin to perceive, in the centre of the mass, or in the cul-de-sac of the injected joint if you are treating an arthritis, a sensation of elastic resistance, or even of free fluctuation, announcing the fact that softening has occurred.

From that time, you puncture and inject, but extending the intervals between the sittings, not making more than one each week.

You will go up to 7 or 8 punctures and injections (counting from the day when the softening was obtained).

In a word, one proceeds here practically as if one were dealing with a tuberculosis suppurated at the onset.

If there still remain here and there small indurated points, they need not detain you, for they will disappear eventually in the course of the progressive contraction of the injected tissues, a contraction which continues for a very long time.

**Which ought one to seek for? Hardening or softening?**

Softening *is better on principle*, for it leads to the complete expulsion of the tuberculous products out of the organism, hence the cure is more certain and more definite. But, on the other hand, the inflammatory reaction set up by the softening injections is notably more marked; it is sometimes even a little painful, therefore in patients who are sensitive but in no hurry, such as the children of the upper classes, I would advise you to begin the injections of oil, creosote and iodoform,

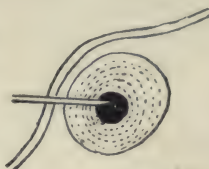


Fig. 146.—The liquid produces a cavity in the centre of the gland, which increases gradually, by successive softening of its layers.



which may suffice, and even have 70 chances in 100 of success : but in the case where, four months later, the cure has not been obtained thus, one has recourse then to the softening injections of camphorated naphthol.

Or again, you could adopt the following procedure :—

For *tuberculoses, recent, and of benign appearance, try hardening* (injection of oil, creosote and iodoform).

For *old tuberculoses* or those of *grave appearance, try softening* (injection of camphorated naphthol).

I have just pointed out the reaction produced by the injections in the dry or fungating tuberculoses.

This reaction is desired. It is necessary. Its object is to transform the chronic inflammatory process produced by the bacillus into a subacute or even distinctly acute inflammatory process.

Therefore, the injections bring about, or ought to bring about, an inflammation, slight or intense. It is slight with the oil, creosote and iodoform, it is more active with the naphthol, camphor or the sulphuricinated phenol. It depends also on the dose of liquid injected and the greater or less frequency of the injections.

Let there be no misunderstanding : it is not of the immediate reaction that I am speaking of here, for with our liquids, the reaction is nil or insignificant, whilst with iodoform and ether it is very active, and with zinc chloride it is very painful, even agonising, for several hours.

No, I wish to speak of the reaction of to-morrow and the day after. A reaction looked for, I repeat, a welcome reaction, since we wish for nothing less, with the naphthol camphor and our softening mixture, for example, than to transform, in a few days, into a liquid state, solid and sometimes very hard tuberculous masses. It is evident that this cannot occur without symptomatic manifestations which accompany the formation of an acute abscess, or, at least, a “ tepid ” abscess.

\* Above all things, never forget to forewarn the parents or

those interested, of the early appearance and need for this local and general reaction, without which you will expose yourself to reproach, or even find yourself refused permission to continue the treatment; whilst if they are forewarned, they will find all this quite natural and very satisfactory, since reaction is the herald of the approaching softening of the fungosities and of the success of the treatment. Still, it is necessary that the inflammation should not pass a certain point, beyond which it would be very painful. The ideal is to reconcile everything, to liquefy the fungosities without distressing the patient, which is what happens generally, if you keep to the doses and the intervals indicated above (see p. 160).

If, in some patient, the reaction obtained after the first injections is not sufficient, increase the dose, or lessen the intervals between the injections. If, on the contrary, the reaction obtained from the beginning is more intense than would be desirable, reduce the dose to be injected and allow more time to elapse between two injections.

### **The indications and method of employment of the other softening agent for tuberculous lesions.**

To obtain *softening* in fungous arthritis, we use as a rule, *camphorated naphthol* and *glycerine*. This mixture is an excellent one, but acts only when injected in considerable quantity, 3 to 8 gr. as we have said, in the treatment of arthritis, where the injection is made into a joint cavity, but it is not so in the case of a small cervical gland, where one cannot inject the necessary 5 or 6 gr. of liquid, nor even 3 or 4 gr.

In that case, in order to soften a hard adenitis, it is better to use a liquid active even in a very small quantity. Such is the mixture of equal parts of sulphoricinated phenol (20 parts of pure phenol to 80 of sulphoricinate of soda), camphorated phenol, camphorated naphthol, and spirit of turpentine.

6 or 8 drops of this liquid are sufficient to effect the softening of the gland. This is how you will use it :

Inject 6 or 8 drops into the centre of the gland or tuberculous mass.

If, after 24 hours, the reaction which follows the injection is very active ; if there is distinct local pain, insomnia, fever above  $100\cdot5^{\circ}$  F., keep to this one injection. On the other hand, if the reaction is almost nil, again inject 6 or 8 drops of the mixture next day or the day after ; this time the injection will be nearly always sufficient to produce softening. You have only to wait until the softening has taken place, which you recognise by the appearance of fluctuation, perceptible at the end of three or four days.

Then you puncture ; you withdraw a viscid pus, the colour of mahogany.

*If the skin is reddened*, do not repeat this ; wait before making another injection until the skin has become normal. *If the skin is not reddened*, inject again, but this time with naphthol camphor and glycerine ; and repeat the puncture and the injection (of naphthol camphor and glycerine) every four days ; you thus make 6 or 7 punctures, with or without injections, according as the skin is normal or reddened. After the sixth or seventh puncture, you make a last puncture, this one without injection afterwards, and then apply pressure. In a word, you proceed as in the treatment of an ordinary cold abscess. If, two or three weeks later, there still remains a crescent of gland, unaffected by the injection, recommence the injections of softening mixture, and carry on this second treatment like the first, with the double purpose of softening the fungous mass and preserving the skin.

It is needless to go on fighting against the small remaining vestiges of the tuberculous mass ; they will disappear in due course by themselves, by a process of hardening.



### III

#### THE TECHNIQUE OF INJECTION IN THE TREATMENT OF TUBERCULOUS FISTULÆ

We shall study, on p. 224, the respective values of the different treatments of tuberculous fistulæ; surgical operations, expectancy, physio-therapeutic methods, sea-air baths, salt-baths,

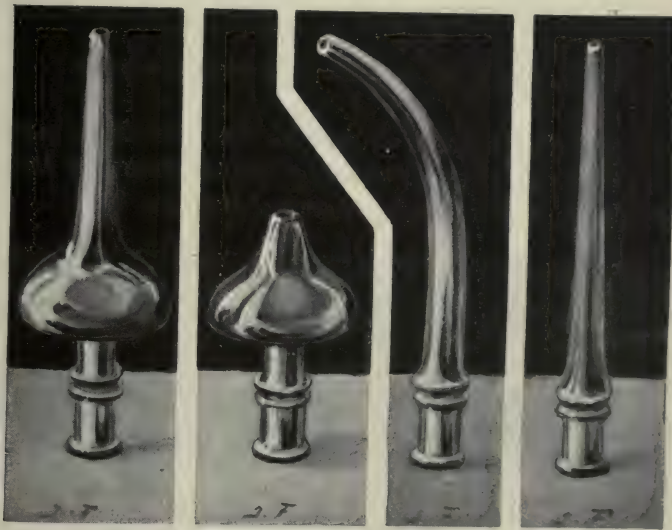


Fig. 147 to 150.—Our different models of nozzles for injecting fistulous tracks of different forms.

or sulphur baths, sun-baths, radio-therapy, radium-therapy, and **modifying injections**.

We shall see that of all these treatments, the last is ever so much the best, and we will tell you why it is the best. Here, we will speak only of the technique of these injections.

### Substances for injection.

Is there anything which has not been injected into tuberculous fistulæ, from the Villattes-liquor of our grandfathers

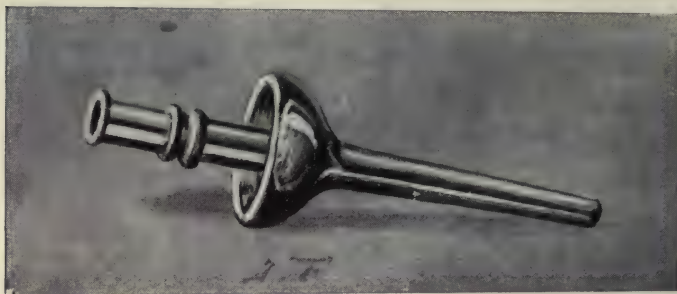


Fig. 151.—Nozzle with a cup-shaped extremity for emptying.

to the pomades so much lauded in our own days, passing by the injections of boiled sea-water, dilute tincture of iodine, weak solution of zinc chloride, tincture of aloes, etc. ?

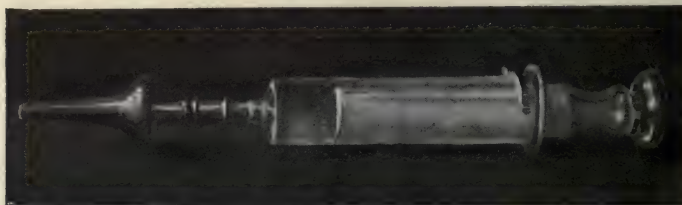


Fig. 152.—The syringe, in glass, mounted with the nozzle.

Well, I have tried all those injections. And after having tried them all, I have come back, always, to our injections of oil, creosote and iodoform, and naphthol camphor and glycerine. Clinical experience brought me back to them ; but reason demonstrated beforehand, that these liquids, already recognised as the best for purifying the wall of cold abscesses, should also be the best for purifying the granular wall, almost identical, of tuberculous fistulæ. These medicated agents are employed in

fistulæ under *the same form*, cold liquid, as in abscesses, whenever the anatomical disposition of the orifice and the cavity allows of the liquid being retained in place.

This is how to proceed :

Make, through the orifice of the fistula, with an ordinary glass syringe, furnished with a nozzle of the length and form appropriate to the track, an injection of 4 to 10 gr. of one of the two solutions mentioned ; block the orifice immediately afterwards, either with a small cone of absorbent cotton wool forming a plug, introduced into the orifice of the fistula to a



Fig. 153.—Glass and ebonite syringe for the treatment of fistulæ (which can be used in lieu of the glass syringe of Collin or of Luer).

depth of 2 or 3 cm., or, simply with a swab of cotton wool, which, placed flat over the orifice, pushes the lips gently inwards—depresses them, in such a way as to prevent the escape of the fluid introduced ; if there are several orifices, an assistant blocks in the same manner the other orifices with small conical plugs of wool or small swabs.

All these swabs are kept in position by a Velpeau bandage carefully applied.

The day after the next, give another injection, and so on every other day.

Each time, remove the swab, or the small conical plugs, and allow the cavity to empty : then inject again.

If the orifice is gaping, if the daily introduction of the syringe and the contact of a more or less irritating liquid increases the aperture too much for the liquid to possibly remain in its place, it is advantageous to suspend the injection for a few days, which will allow the orifice to contract a little.



Towards the twenty-fifth day, that is, after about 10 injections, the active wall is sufficiently modified and refreshed to allow of your ceasing and to reckon upon the union of the walls of the track.

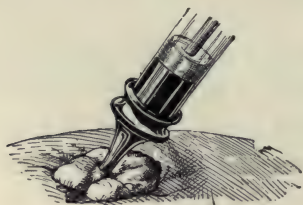


Fig. 154.—The nozzle of the syringe finds the track between the granulation around the orifice of the fistula.

This union is assisted by compressing the parts with small bands of cotton wool placed crosswise and held firmly by Velpeau bandage. This is not always easy (in the case of inguinal fistula in Pott's

disease, for example); but it is done whenever possible.

If adhesion of the two walls is not obtained at the first attempt,

if after 20 days, during which compression must be kept up, there is still an oozing, it is necessary to recommence a new series of from 8 to 10 injections, proceeding as before.

This second series, followed by compression and a second period of waiting, heals another group of fistulæ.

If the fistula is still not cured, I advise you to wait 3 or 4 months before making further injections.



Fig. 155.—Intra-fistulous injection. A strip of damp cotton wool is rolled round the nozzle of the syringe; the left hand of the operator firmly compresses the wound with the tampon, whilst the right hand removes the syringe immediately after the injection is completed.

During these 3 or 4 months of simple aseptic dressings, and of rest, especially at the seaside or in the country, the fistulæ close at last, nearly always, even though they be connected with bone or a joint, provided that one is dealing with

fistulæ not infected (no fever and no albumen being present) (see p. 219).

With a little experience and precaution, you succeed, by means of the conical plugs of cotton wool or tampons, in retaining the liquids in many fistulous tracks.

But with most fistulæ, it is not so; the orifice, or orifices, are gaping too much to allow us to completely close them with the conical plugs or swabs of wool, and to retain completely the liquid in the fistulous tracks. In that case, it is necessary to incorporate the active substances (creosote, iodoform, naphthol,

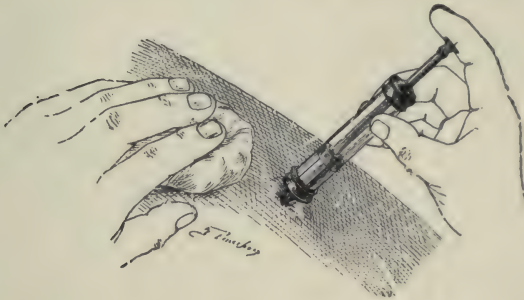


Fig. 156.—Communicating fistulæ. The injection is pushed into one of the orifices, while the left hand, in order to keep the injected liquid in its place, blocks the other by means of a large swab.

or camphorated phenol) with a paste which will dissolve in a water-bath at a temperature of  $104^{\circ}$  F. or thereabouts, and which, being introduced in the form of liquid (without scalding the patient) becomes solidified at the end of one or two minutes, at the temperature of the body.

We have carried out this method for 15 years (that is, 10 years before Beck of Chicago) at our Oise Hospital at Berck, with our assistant P. Pesme, who quoted our results in his thesis (in 1900).

We used at the beginning, a bougie of stearine and naphthol camphor in the proportion of three parts of stearine to one of naphthol camphor. The stearine bougie was previously sterilised by boiling for 20 minutes over an open fire. Before each injection, we used to dissolve our paste in the water-bath.

Immediately it liquefied, we injected it and kept it in place with a tampon, until it was solidified; that occurred after one or two minutes.

The injections were repeated every 3 or 4 days, until 5 or 6 injections had been given.

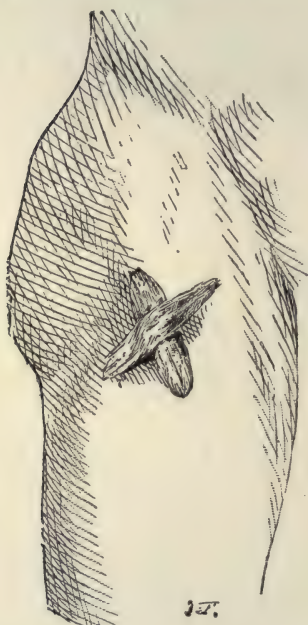


Fig. 157.—The dressing after injection. 1. Two pads crossing each other over the fistula to preserve its occlusion.



Fig. 158.—2. An assistant holds the pads whilst the bandage is applied, the pressure of which keeps the liquid in place, until the next injection.

We have obtained cures by this method; but we observed sometimes in cases of fistulous passages leading into cavities larger than the tracks, phenomena of retention, such as are noticed as well with injections of paraffin pastes: this is due to the fact that stearic acid and paraffin have a melting point relatively high ( $140^{\circ}$  about), and are substances but slightly absorbable. That is why we use hardly anything else to-day



but the following preparations, which give us every satisfaction<sup>1</sup> :—

PASTE No. 1.

Phenol camphor . . . . .	} ââ	6 grammes.
Naphthol camphor . . . . .		
Gaiacol . . . . .		15 „
Iodoform . . . . .		20 „
Lanoline (or spermaceti) . . . . .		100 „

The melting point is about 104° (slightly above).

PASTE No. 2.

Phenol camphor . . . . .	} ââ	3 grammes.
Naphthol camphor . . . . .		
Gaiacol . . . . .		8 „
Iodoform . . . . .		10 „
Lanoline (or spermaceti) . . . . .		100 „

The melting point is about 104° (slightly above).

The first of these pastes being twice as active as the second, we use it for cavities or fistulous tracks of small capacity, that is, of less than 10 c.c. in a child, and of less than 20 c.c. in an adult. On the other hand, we use the paste No. 2 for large cavities, that is, those exceeding the dimensions we have just given.

You may inject 10 c.c. of the first in a child of ten years, and up to 20 c.c. in an adult.

Of the second paste you may inject double the quantity, that is, 20 c.c. in an infant and 40 c.c. in an adult.

As a matter of fact we hardly ever reach those figures, but they may be reached without inconvenience.

If you take care not to exceed them, you will never observe a serious accident of intoxication, whilst there have been cases of death with the bismuth pastes. Neither will

<sup>1</sup> You can prepare these pastes yourself, as we have done personally, or you can order them from your pharmacist, if you are certain of his asepsis, or you may inquire of Messieurs Ducatte, or Johan, or Gogibus of Berck.

you have any accidents through retention<sup>1</sup> with our preparations.

As to the technique, it is the same as that indicated before for injection of the stearic acid and naphthol camphor paste, that is, you soften the paste in a water-bath, then you charge the syringe, previously warmed (in hot boiled water), and immediately introduce the injection into the fistulous track in the way represented in fig. 159.

We will go into some of the details.

The flask of paste, opened, is placed in water in a saucepan heated by a spirit lamp or by gas. After some minutes, the paste softens; then stir it with a glass rod in order to render it homogeneous.

Then, from the wide-mouthed flask containing the paste, charge your syringe, which has previously been warmed by filling and emptying two or three times with hot water which has been boiled (now at 104° to 112°); attach to the syringe a metallic nozzle appropriate to the shape of the track and already warmed like the syringe in hot water. Immediately push the injection into the fistula.

If several fistulæ exist, push in the whole of the injection by one only of the orifices, which you know to be in communication with the others; whilst the injection is penetrating, close all the other openings with swabs kept in position by one, two, or three, improvised assistants.

You will foresee that there is a double danger to avoid. The first is that of injecting the liquid too hot, in which case you run the risk of scalding the patient. The second is, on the contrary, injecting the liquid too cold, in which case the fluid will solidify in the syringe before you have time to inject it. You will easily succeed, with a little practice, if you guard

<sup>1</sup> It remains to be well understood that you never give a modifying injection of any kind in case of infected tuberculous fistulæ, as is explained on p. 231.

against this double danger, which is, otherwise, but little to be feared, if you use our paste.

When the paste is liquefied, it is at the temperature of from  $104^{\circ}$  to  $112^{\circ}$ ; you then charge your syringe at once. If, at this moment, the paste appears to be too hot, which the practitioner can judge by simply feeling the syringe, wait 5, 10 or 15 seconds before injecting: wait until it has cooled down to about  $104^{\circ}$ , which is the right temperature, neither too hot nor too cold, for injection.

Push your injection neither too quickly nor too slowly; take 5 or 10 seconds, for example. I am in the habit of using a large syringe of 20 c.c. capacity, but the ordinary small syringe can be used.

If the cavity is small, the piston of the syringe is very soon arrested, or the fluid returns. In that case you keep the syringe in its place until the solidification of the liquid paste is effected.

If the cavity is very large, if it is not filled by the contents of the syringe (which happens sometimes when only a small syringe is at your service), quickly remove it (keeping up pressure over the orifice with a tampon), then charge it afresh to inject a second dose, and, if need be, a third, until you reach the quantity of paste given above. Nearly always you will have to stop before this on account of the resistance offered to the penetration of the liquid, and sometimes by the painful sensation of fulness complained of by the patient. However, when there is but little pain, you need not take much notice of it; it will pass off almost immediately.

Once the solidification of the paste is produced, apply the dressing.

The subsequent reaction is variable; sometimes there is none, in other cases it may be accompanied by a fever of  $100^{\circ}$  or  $102^{\circ}$  for one or two days (I speak always of non-infected fistulæ, for in fistulæ which are infected, the reaction may be



much more active, and in them, as you know, injections are contra-indicated for other reasons).

In case of fever, remove the dressing next day and, if the region is red and tense, apply a damp dressing; if it is not, apply an ordinary dry one. At any rate, when there is no fever following the injection you must change the dressing on



Fig. 159.—Technique of the paste injection when there are several fistulæ present. There were eight in the present case. You introduce the nozzle (straight or curved according to the case) into the most accessible passage; while one, two or three assistants armed with swabs block the other orifices, you push in the injection gently and evenly, without jerking. You hold on, with the help of the assistants, until the paste is solidified (which requires about a minute and a half to take place).

the fourth or fifth day, and even sooner in cases where the discharge is very abundant.

Sometimes the discharge dries up at once. I have observed the fact several times. I have seen especially a discharge, continuing for three years, dry up after a single injection of paste of naphthol camphor. That was the case in the patient represented on p. 226 (fig. 192).

Scarcely ever, however, is the result so complete and so rapid. The discharge does not cease, still it is already a

little modified; it contains debris of the paste; it is more serous.

Make a second injection on the fourth or fifth day after the first one. Recommence the injections of paste every four days, until they amount to seven or eight injections.

Then, a period of waiting of equal duration—30 days, after which the fistula is often closed; if not, recommence a new series of injections and a new period of rest, and so on for six months. Then, three or four months of rest and aseptic dressings, without injections as above, until you have obtained a cure, which will happen nearly always<sup>1</sup> even in fistulæ of osseous origin, provided that we have to deal with non-infected fistulæ and that the patient is placed under good general treatment (life in the country, or, better, by the sea).

Refer to p. 220 and onwards as to the question of the prognosis of tuberculous fistulæ; here, as we have already said, we are speaking of the proper technique of the injections only.

<sup>1</sup> We have used bismuth pastes in the same way; but they have given much less satisfactory results than our own preparations of naphthol camphor, gaiacol and iodoform.

## CHAPTER IV

### ON THE PROGNOSIS AND TREATMENT OF EXTERNAL TUBERCULOSES

#### *A.—The attitude practitioners take with regard to these affections*

How many times have I wished that practitioners who have the treatment of hip disease, or of Pott's disease, or of white swellings, would come and pass a few days, or even a few hours, at Berck, where external tuberculoses come to us in thousands from all over the world! A simple visit would spare them many disappointments and disasters, in showing them, so to speak, the watchword, and putting them into the proper state of mind for carrying out the treatment well.

They would carry away as "souvenirs" of Berck, the capital ideas which follow and which are too little known, and which also summarise "**all the wisdom**" acquired concerning external tuberculoses.

1. The **duration, particularly long**, of these affections, is that of one year as a minimum, and often several years.<sup>1</sup> The obligation devolves upon the practitioner of watching over

<sup>1</sup> In reality, if, in their common forms, these tuberculoses can be cured in a year, it is only on the condition of their being treated by injections made *into* the focus. Without injections it will be necessary to reckon three, four or five years. Unhappily, there are cases where the injections are not practicable; for example, Pott's disease without abscess; the vertebral body, the seat of the lesion, is too far away to be reached by the syringe without uncertainty and without danger.



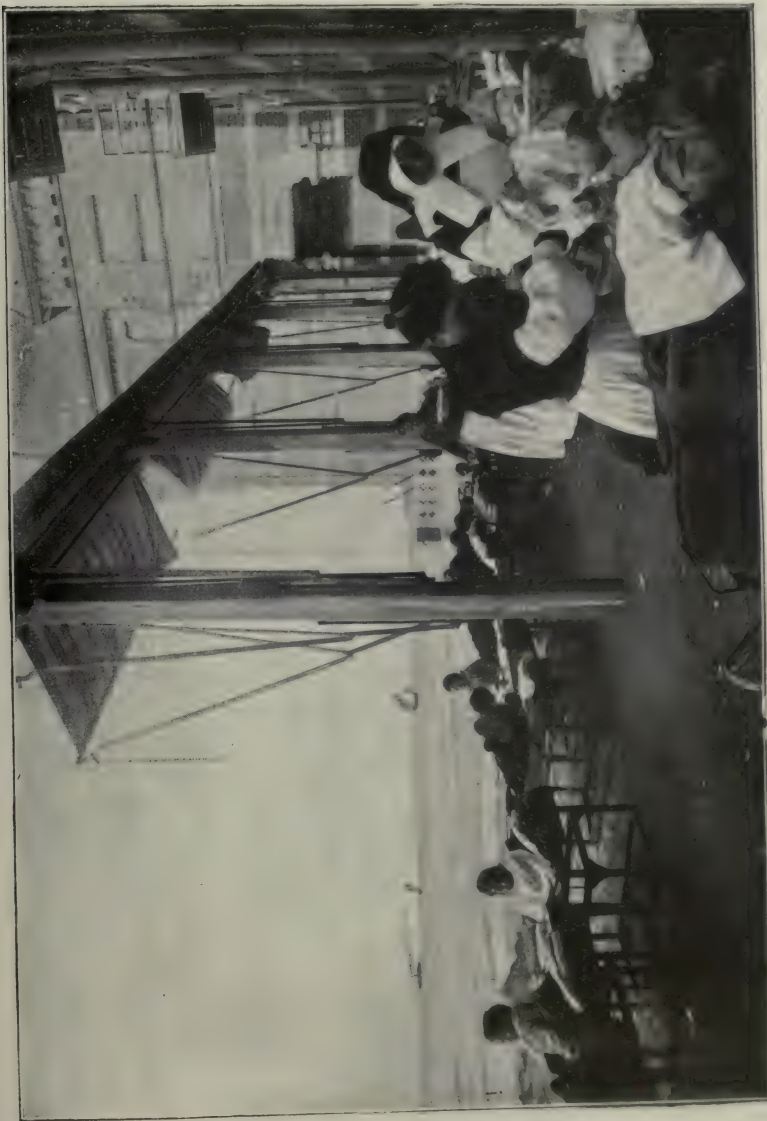


Fig. 180.—Patients passing the whole day on the shore at Bereh in a continuous bath of sea-air, light and sun.

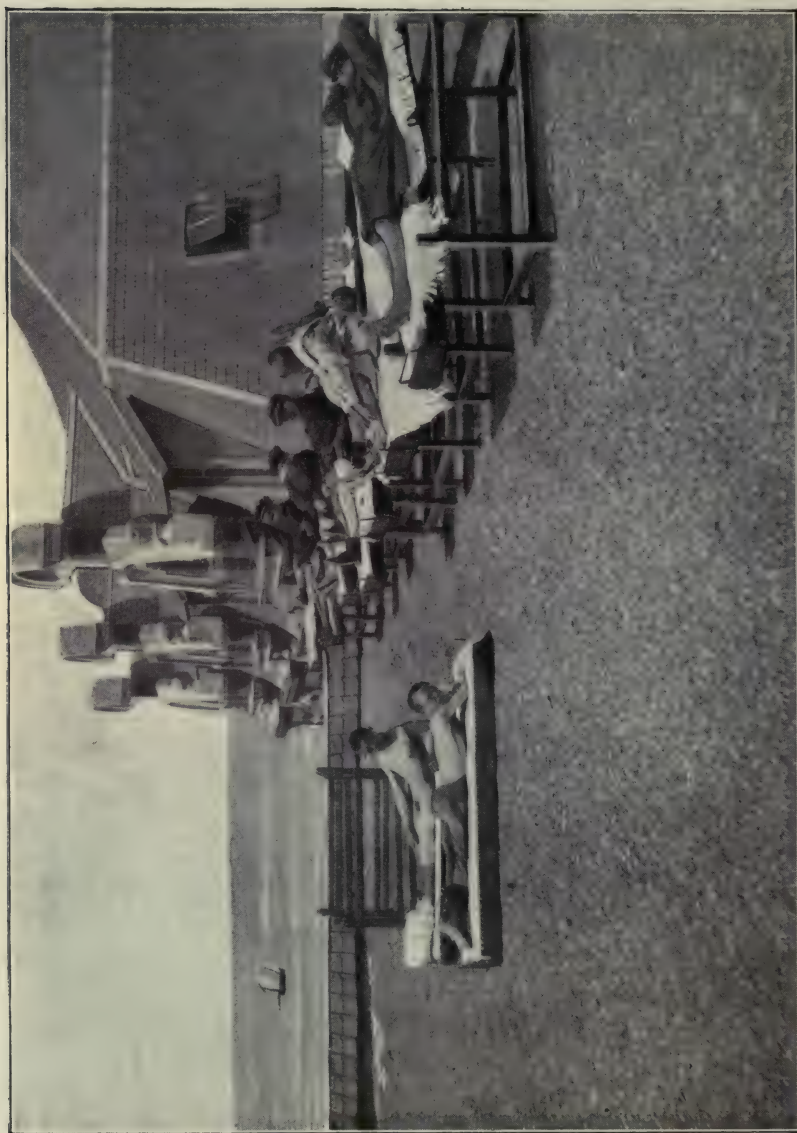


Fig. 161.—How the patients are installed here in the open air, and how they could be installed anywhere.

his patient, not only during the long period of activity of the disease, but far beyond that, for perhaps one year, two years, three years, in default of which a relapse may occur, and the entire orthopædic results obtained up to that time, lost.

2. The **necessity** for all patients to live **out of doors from morning until evening**, in **all seasons** and in **all weathers**,<sup>1</sup> in a perpetual bath of pure air and sunlight.

3. The necessity for keeping at rest in the recumbent position of patients afflicted with Pott's disease, hip disease or tuberculosis of the lower limbs, until the focus is extinguished, that is, in many cases, for several years.

Well, all this you will learn in a short visit to Berck. At the same time you will see how the two indications for **outdoor** life and the **recumbent position**, which are considered by some people to be incompatible,<sup>2</sup> are in reality easy to reconcile, even for people of small means. The only thing necessary is to put the patients on a "cadre."

Here is a very simple model of a wooden bed (cadre) with a mattress of horse-hair, designed so that it may be constructed everywhere.

The patients are laid horizontally and strapped on the beds, which are provided with a handle at each end to allow of their easy removal into the open air.

The patients are thus carried every morning out of doors; they pass the day, reclining either on trestles or on a chassis

<sup>1</sup> They are clothed in a suitable way, and sheltered if need be.

<sup>2</sup> That which makes them, so often, sacrifice the one to the other.

The Germans and the English, in carrying out the general treatment before the local treatment, allow their patients to walk about, to ensure for them, above all things, life in the open air.

The French, on the contrary, give the preference to the local over the general treatment, keeping their patients in bed "in the ward" (as one sees in many hospitals for children)—which is, perhaps, a worse mistake.

The correct formula is—**plenty of air and perfect rest at the same time.**



(about a metre high), or simply on the ground, or drawn about

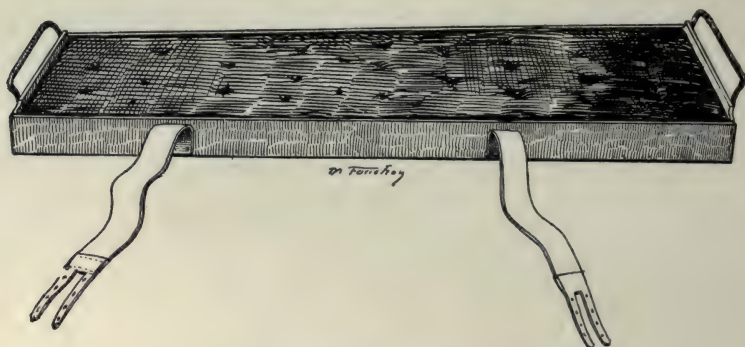


Fig. 162.—The bed upon which the patient lies.

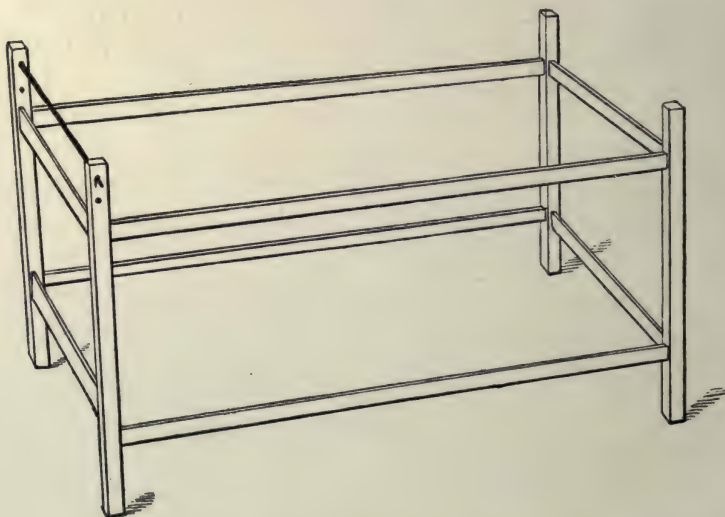


Fig. 163.—The bed is placed on this wooden frame.

in the small carriages (such as those you see by hundreds furrowing the sands at Berck).<sup>1</sup>

<sup>1</sup> The same is done for all affections (other than the external tuberculoses), the treatment of which requires a long rest (namely, rickets, infantile paralysis,

4. You learn also at Berck that, contrary to widespread prejudice, the patients **do not pine away nor are wearied, in the recumbent position.**

The first thing which strikes and surprises all the visitors are the very happy countenances, rosy and plump, of all the patients, extended on their beds. Therefore, medical men will be able to reassure parents who are fearful *à priori*, for the

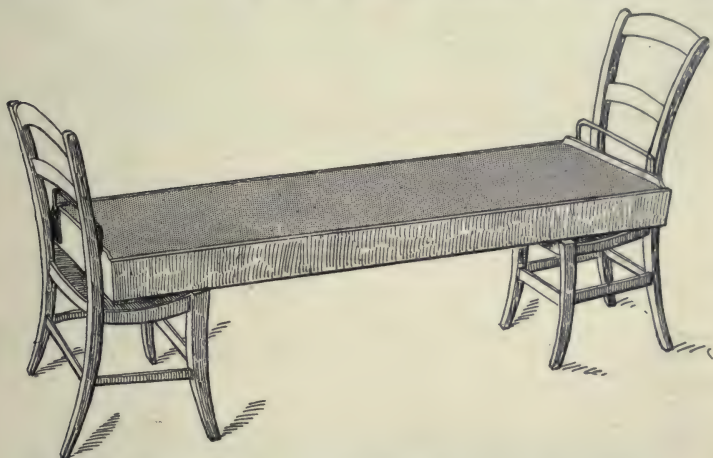


Fig. 164.—In default of trestles, the bed is placed on two chairs.

general health of their children, and of the effects of the recumbent position kept up for so long a time.

How natural and essential this position appears at Berck, while it seems so abnormal elsewhere !

At Berck—owing to the surroundings, and to the encouragement given new patients by those already cured—every one, from the day of arrival, cheerfully accommodates himself to the common *régime* of rest in the recumbent position.

5. Finally, practitioners will learn at Berck that **difficult and nevertheless important principle—not to operate on**

congenital dislocation of the hip, osteomyelitis, syphilis of the bones and joints, etc.).

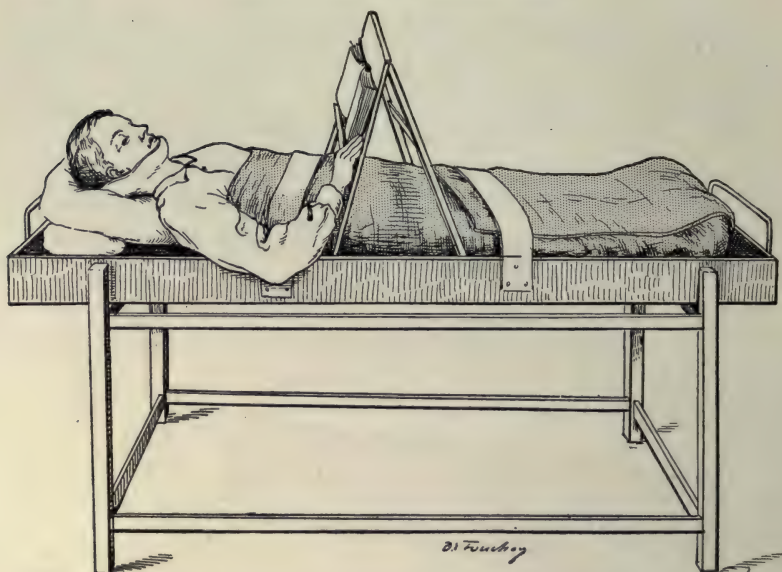


Fig. 165.—Thanks to a movable reading-desk, the patient is able to read and work. As can be seen, this patient is wearing a large plaster apparatus for Pott's disease.



Fig. 166.—The patients take their meals in the open air.



these patients. They will learn that the *knife is the enemy of these affections*<sup>1</sup>; that the only way to cure what are called the surgical tuberculoses is, in fact, never (or very nearly never) to perform a surgical operation, but to put away all his grand array of instruments in order to take



Fig. 167.—In order that he may get about, the bed is transferred to a small carriage.

up this “inglorious” work, which consists in making injections and punctures, gentle redressments, plaster apparatus, and dressings.

#### *Why these affections are so well cured at Berck*

In the local treatment and in the observance of hygienic rules and general treatment lies the secret of the cure of external tuberculoses at Berck—not forgetting, mind you, to allow for the effect of the sea-air.

<sup>1</sup> A general practitioner may agree to this, perhaps, but it will be more difficult to convince a surgeon who has generally been trained to place all his faith in the knife.



Fig. 168.—A patient driving his own carriage. In the background, other carriages standing.



Fig. 169.—Patients (at Berck) meeting for conversation and enjoyment.



Fig. 170.—When the disease permits of some movement (as in the case of this child with tuberculous disease of the foot), the bed is placed on the sand and the child joins in the amusements of his friends who are already cured.



Fig. 171.—These two children, suffering with Pott's disease, have been recumbent and plastered for 18 months. One can see that their general condition leaves nothing to be desired.



### Summary of Treatment.

It is, thanks to that, that the medical treatment is reduced, at Berck, to almost nothing. The keen air of the seashore stimulates the appetites of the patients and ensures the good operation of the digestive organs. They eat "double," they digest well, they grow fat, and therefore have never—or hardly ever—need for medicaments.

One may **recapitulate**, in a few words, what is necessary to be done to cure the large external tuberculoses :

**" Prolonged rest—Life in the open air—Rational overfeeding—Modifying injections—Well-made apparatus.**

With this additional advice as to what is not to be done :  
**" No surgical interference—No violent straightening."**

### *B.—Prognosis in these affections*

#### **The risks of death and the means of evading them**

As soon as you have made the diagnosis of Pott's disease, hip disease or white swelling, you will ask yourself—before even speaking of treatment—will the patient be cured ?

In order that you may answer the question, we will proceed to describe what are, in the above diseases, the risks of death and what are the means taken to guard against them.

The risks may be arranged under three chief heads :

1. *Slow septicæmia* leading to *visceral degeneration*.
2. *Generalised tuberculosis* (in the lungs, kidneys, or bladder).
3. *Meningitis*, which is, correctly speaking, only another form of generalised tuberculosis, but requires special mention on account of its importance.

**1. Slow septicæmia, hectic fever and visceral degeneration**  
*(fig. 172, 173 and 174)*

This is the cause of nine-tenths of the deaths in Pott's disease and hip disease; it is the same at Berck as in Paris. Twenty years ago, at the "Hopital Maritime," a series of twelve



Fig. 172.—Pott's disease with fistulæ; the cachexia is made apparent in this child by an exceedingly large liver (*v.* fig. 173), by albuminuria and fever (*v.* fig. 174).

cases of Pott's disease which had supplicated, were operated upon and curetted by the great surgeon Cazin of Berck. Eleven of them succumbed before the end of the first year, and the

twelfth the year afterwards, all carried off by slow progressive wasting of the body (hectic fever and albuminuria) which followed the operation after 3, 6, 9 and 10 months. Of 100 cases of hip disease resected about the same time by the same expert surgeon, 90 were dead in less than ten years after the operation, carried off, also, by slow septicæmia and hepatic and renal degeneration.



Fig. 173.—Normal outline of the liver.

This terrible *dénouement* was so foregone a conclusion that one used to say at once of every child stricken with hip disease or suppurated Pott's disease, "He is doomed."

But I speak of twenty years ago!

To-day this frightful nightmare is at an end! Everything is changed, so thoroughly changed, that the reverse is now true. The fate in store for these patients is not death, but cure.



We often repeat, in the familiar causeries of our practice, that our speciality (especially with regard to those of us who study external tuberculoses) was at one time the worst of all, the most depressing, the most demoralising; that to-day it is the most beautiful, the most comforting, one which produces the most numerous and excellent cures, one in which we have the greatest certainty of being useful.

What has worked this miracle? It should be, here as in all other departments of surgery, the advent of antiseptics and the perfection of technique. Never!

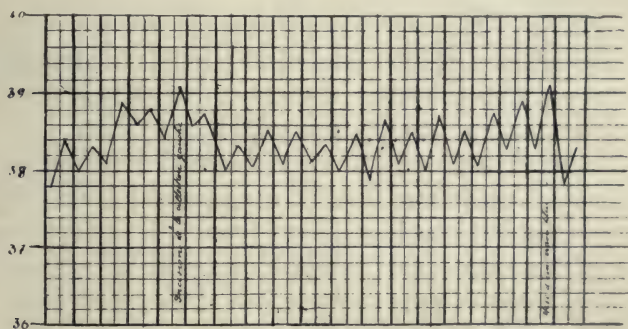


Fig. 174.—Portion of chart in the case of the child in fig. 172 suffering with Pott's disease and operated upon (incision and scraping) for an abscess in the right iliac fossa. The patient succumbed in the thirteenth month of hectic fever and visceral degeneration.

It is not because we perform operations aseptically, more correctly and more rapidly; it is simply because we operate upon them no longer.

For, by not operating upon the tuberculoses, by not opening the bacilli-laden foci (nor allowing them to open), we close the door to external septic infections, whilst, by operating upon them (**however clever the operator**)<sup>1</sup> a door is opened for

<sup>1</sup> The great surgeons, who, by their so-called radical operations, undertake to remove the whole of the trouble, will succeed only in one thing; they will remove everything . . . the patient.

the secondary septic infections which conduct the patient to death.<sup>1</sup> That is what we have learned in an experience of twenty years.

All that, we have already said ; if we return to it once more, it is because it is necessary, seeing that so many surgeons or physicians **persist in closing their eyes to the light** and still transgress, every day, the great commandment, the fundamental dogma, never to open tuberculous foci.

### **The means of evading the first risk of death**

These means you have guessed at ; they are most simple, and observe that, in reality, it gives us less trouble nowadays to cure our patients than it formerly did to kill them.

What must be done ? In the presence of a non-suppurated tuberculosis, abstain from any cutting operation ; in the presence of a suppurated tuberculosis do not touch it if the tuberculous foci are difficult to attack, in which case they do not threaten the skin ; when they do threaten it and they are then easily accessible, puncture and inject them ; we have described how to do this (see Chap. III.).

Then you will cure hip disease and Pott's disease, always, or nearly always.<sup>2</sup>

And not only you, but also the second year's student, who knows how to make a puncture and an injection, will cure external tuberculoses infinitely better than the great surgeon who is anxious to operate upon them at all costs. As you see, you require only the inclination to be able to avoid

<sup>1</sup> "In closed tuberculoses, cure is certain. To open them (or allow them to open) is to open a door by which death too often will enter."

<sup>2</sup> I say nearly always, because in spite of all the efforts made to hinder the opening, one will not be absolutely successful in every case ; for, if the technique of punctures and injections is relatively easy, it is nevertheless very exact, and one may make mistakes in applying it—"errare humanum est."

this first and great risk of death which threatens patients suffering from the grave external tuberculoses : *slow septicæmia and visceral degeneration*.

## 2. The danger of generalisation of tuberculosis

This risk is much less than the preceding one—it is nearly as little as the first is great. Nevertheless, attend carefully to what I say.

If at Berck we scarcely ever see this generalisation—only perhaps once in a hundred cases—it is because Berck is, without contradiction, the ideal locality for these maladies, and is especially suitable for children. It is certain that for subjects—especially adult subjects—living in bad surroundings, the risk of generalisation will be very real. It is not very rare to find it in the large towns, where patients who have commenced with a Pott's disease, or hip disease, or a white swelling of the knee, finish with tuberculosis of the lung.

How can the danger be warded off ?

The remedy should be to make all these patients live by the sea ; but it is impossible, evidently, for most of them to do so, and this is why practitioners, wherever they are, ought to know how to treat the external tuberculoses. (They will, I hope, give me credit that I am endeavouring to assist them, and that this book has no other purpose.)

However, I will say to them, your patient cannot go to the seaside ; therefore he is, certainly, a little less well armed against a generalisation of tuberculosis, maybe ; but, at least, do not add to this drawback, nor lessen—by the kind of life you allow him to lead—the very great chances of cure which remain to him.

I will explain what I am saying.

What makes the superiority of a sojourn at Berck is not only that the pure air is more tonic than at other places, but that the patients profit more by it.



For our patients at Berck—hip cases, Pott's, etc.—live in the open air *from morning till evening in all seasons and in all weathers*, keeping always at rest, reclining on frames, on the small carriages that promenade the seashore (fig. 175). I intentionally insist on this point.

But what do you see in the country, and still more in large towns?

You see patients stricken with hip disease, Pott's disease,



Fig. 175.—At Berck, our patients pass the whole day on the shore; their carriages are fitted with leather aprons and hoods, which protect them from the glare of the sun and from the rain.

white swelling, who, especially if they are seriously ill, are shut up, hidden away in their chambers and in bed with every chink stopped up. This is done for material reasons: because the parents have not contrived, and do not know how to contrive, their going out of doors "in bed"; they have not, as a rule, either a transportable bed or a carriage.

And also, for moral reasons; because the patient himself refuses to go out, and because his parents avoid making him

do so ; he does not wish to be seen, and they do not wish to expose him.

A young lady afflicted with Pott's disease, and lying on her mattress in a carriage, said to me, "Imagine my feelings if I were carried about the streets of our little town in this turn-out ! At every step, I should be obliged to submit to the remarks and condolences of strangers, and, still worse, of my friends, and I, in this long low carriage, going at a foot pace, should think I were on a bier ; anywhere else I should be a phenomenon, whilst at Berck . . . I am in the fashion !"

And this is why, in the country and in towns, the patients waste away in their chambers, which they never leave. Or, they who ought to be resting on a bed completely horizontal, so as to fulfil the best conditions for the repair of their hip disease or Pott's disease, are unwilling to go out, except upright, with or without an apparatus.

#### **The Remedy against the Risk of Generalised Tuberculosis**

As to the remedy, there is only one, for your patients who are restricted to the country or to town life.

You must take your courage in both hands and impart it to your patients, in order to triumph over the prejudice and the obstacles which prevent them living out of doors.

In the country this is relatively easy to accomplish. The patient cannot have a carriage, it would cost too much, materially and morally ; very well, be it so, he need only be strapped on a large frame and carried in the morning into the garden, where he will pass the entire day (fig. 176).

In town, it is less easily managed, I admit, for those patients who are not able to go away, and who possess no garden of their own ; but they might be able often, with a little courage and initiative, to be carried into the neighbouring square and remain there for many hours. When once the habit has been acquired, nothing could appear more simple.

If you do this, if you have the necessary courage to insist on this being done, informing your patient and his friends that a cure is the prize to be won, you would overcome almost certainly the risk of generalised tuberculosis, which is the second risk of death.

But it is not only by good general treatment that you can accomplish this.



Fig. 176.—This is what you *could do everywhere* in the country. White swelling of the knee. The patient immobilised on a bed (the bed of wood, the mattress of horse-hair) which is carried into the court or into the garden, where he passes the day. Those suffering from hip disease and Pott's disease are laid entirely flat, without a pillow.

It is certain that an **objectionable local treatment** may lead to a risk of generalisation ; for example, a cutting operation is not only objectionable because it opens the door to septic infections and visceral degenerations, but also because it creates a risk of inoculation of the lungs and other organs.

Erasion, the scraping away of tuberculous tissues, which



causes hæmorrhage in all such interferences, setting at liberty tubercule bacilli which may move off to colonise far away, explains too well certain post-operative tuberculous generalisations. I have observed it undoubtedly in cases in my own practice fifteen or twenty years ago, at the time when I still operated upon external tuberculosis.

Add to all this, that operations, in lessening the general resistance of the patient, render the organism still more vulnerable and more "inoculable."

The non-immobilisation of painful osteo-arthritis, the violent straightening of deformities of the hip, of the back, of the knee, may also favour or provoke the generalisation of tuberculosis.

I say that, in order to do away with these different risks, you must ensure perfect repose of the patient, construct comfortable, that is to say, well-fitting apparatus, neither loose nor tight, avoid rough corrections, and replace them by corrections which are gentle and progressive.

### 3. There remains the danger of meningitis

All that I have just said may be applied to meningitis. I consider that in improving on the one part the resistance of the subject and on the other by avoiding anything harmful in the way of local treatment, that is to say, any cutting operation, any roughness in correction, any painful treatment, by forbidding brain work and exercise or premature walking, one puts the patient under the best conditions for preventing the occurrence of meningitis.

This gives me an opportunity of saying something as to the risk of meningitis created in children sojourning by the sea, in particular by sojourning at the shores of the North of France. I believed in it twenty years ago, on the strength of the classical treatises. Well, I do not believe in it any longer, after twenty years' experience and personal observation.

I will go further than that—I consider to-day that it is the contrary which is true.

But first, it is well known that all children, and with stronger reason, all carriers of external tuberculosis, may have meningitis. And it is still more true of those who are debilitated and ill-conditioned.

But at Berck, children are better than anywhere else—they eat better, breathe better, grow fatter, become stronger, and one can understand that they must be, *on this account*, more resistant and more *immune* against meningitis than they would be anywhere else.

And this is not a mere fancy nor a matter of opinion—the facts are there.

I have scarcely ever seen meningitis—only one, two or three cases a year—less than one in a thousand of the children afflicted with external tuberculosis whom I have treated.

But I hasten to add that that has been so for only a dozen years! I observed a considerable number of cases of meningitis in former years, perhaps ten or fifteen yearly.

Do you know why? Because at that time, now far off, I operated upon the tuberculoses, or I corrected at a single sitting tuberculous deformities (hip disease, Pott's disease, white swellings) as others did elsewhere, and as many still do to-day.

When, then, certain surgeons asserted that their cases of forcible straightening of hip disease did not show a greater tendency to meningitis than those left untouched, I affirmed distinctly to the contrary, basing my opinion on the results of my personal experience.

And upon another surgeon practising at a maritime station (not Berck) stating that he believed that he had observed an appreciable number of cases of meningitis *at the commencement of their sojourn at the seaside* (that is to say, at the moment when they would especially feel the effect of sea-air, the effect being too stimulating for some children), I replied that I had

never seen anything to confirm that opinion; and that, if new patients are especially disposed to meningitis, it is due, in my opinion, not to the stimulating effect of sea-air, but, very often, in some marine hospitals, **to their being operated upon or forcibly redressed** soon after their **arrival at the seaside**. But we have already described the grievous influence on the meninges of such mischievous traumatisms.

I could cite instances in support of what I here advance. Without wishing to spend too much time upon the question, I have said enough to draw the following conclusions, which I ask you to remember:—

### Practical Conclusions

There are three risks of death in the external tuberculoses—

1. *Amyloid degeneration of the liver and of the kidneys*, which causes nine-tenths of the deaths.

This degeneration is due to the opening-up of tuberculous foci.

In order to guard against it, it is sufficient to prevent such opening-up. In other words, you ought never to operate upon the external tuberculoses, never open a Psoas abscess, but puncture and inject it.

2. *Generalisation of tuberculosis in the lung, in the kidney, and in the bladder*.

You will avoid this nearly always if the patient live out of doors in the open air from morning till evening, and if you yourself abstain from all violent interference in the general treatment, that is to say, that you perform your redressments of hip disease and white swellings, gently and by stages.

3. *Meningitis*.

You will always avoid this, or nearly always, by increasing the general resistance of the patient (and for this object, the sojourn by the sea is evidently the best; which does not, of course, dispense with watch being kept during the stay, especially



if it is a question of a nervous child), by assuring the cerebral repose of the patients, and by your abstaining from all cutting operations and forcible redressments.<sup>1</sup>

***It is possible to promise a cure***

And now you know the answer you have a right to give to those parents who, having brought you a patient with external tuberculosis, ask you at once if he will be cured.

Yes, you may promise them that he will be cured, or, rather, that you will cure him; for he will not be cured unattended; he will not be cured if he is treated roughly; he will be cured because you know what is necessary to be done and how to avoid what would prevent or compromise the cure.

***C. On the local treatment of external tuberculoses***

The following considerations are directed not only to the tuberculoses called "orthopædic" (Pott's disease, hip disease, white swelling), but also to tuberculoses of the soft tissues (adenitis, synovitis, epididymitis, etc.).

**The respective value of the different treatments**

***1. In the suppurated tuberculoses***

In the presence of a **suppurated** tuberculosis, what would you do?

There are three possible procedures:

<sup>1</sup> Which does not mean, I repeat it, that you will not do what is necessary and sufficient for the redressment of vicious positions. No, you would correct them, but in the right manner. Formerly, I used to make forcible corrections after the method of Bonnet of Lyons, which is still that of nearly all surgeons (by movements alternately of flexion and extension, movements carried on for a quarter of an hour). I have not made such corrections for many years now, but I succeed as well to-day with mild measures, slow and progressive, in correcting the vicious positions and keeping them corrected. And you will succeed equally well if you follow the indications given in this book for each deformity.

1. Operation ;
2. Abstention ;
3. Punctures and injections.<sup>1</sup>

1. **The value of surgical operation.**—Without doubt, surgical operation can claim a large number of cures, when it is made very completely, that is to say, in disease of the cervical glands, or in very accessible tuberculosis in the limbs.

Nevertheless, you know very well that to go very widely beyond the limits of the disease is not an absolute guarantee of its cure ; for a tuberculous inoculation of tissues, up to this time sound but vascular, and brought into contact with bacilli by the operative act itself, always remains possible ; this accounts for the fact that, even in superficial accessible tuberculoses, the largest operations often leave fistulæ behind.

But **fistula is the rule** (for the same reason and especially, because operation has not been able to get beyond the limits of the disease), when deep tuberculoses of bones or of joints of limbs are in question, and especially Pott's disease, for which it is always impossible to perform a really complete operation.

*Fistula is the rule.*—Have practitioners the least doubt as to the mischief they have done in transforming this Pott's disease or that unopened coxitis, into a coxitis or a Pott's opened ?

**Closed**, Pott's disease has ninety-nine chances in a hundred of being cured ; **opened**, the proportion is reversed : it is ninety-nine chances in a hundred that the case will terminate in **death**—a little sooner, a little later. That is what the practitioner has done, with a light heart, in opening a Psoas abscess.

It is **a door** leading to **death** which he has opened. Through the fistulæ, in fact, will penetrate septic germs causing secondary or mixed infections, infections superadded to the pure tuberculosis which has existed until then alone.

And if, after that, pus is retained, which it almost constantly

<sup>1</sup> I have not mentioned a fourth treatment, the *method of de Bier*, which, good as I believe it to be, in acute phlegmonous inflammation, whitlows, etc. is of no value, I am sure, against external tuberculoses.

is, in the long and tortuous tracks which separate, for example, a focus of dorso-lumbar Pott's disease from a fistula burrowing in the thigh; if such retention occur, it will be almost impossible to remedy it; there will be **fever** and **septic absorption** which will pave the way to **visceral degenerations** (liver and kidneys), culminating in the **death** of the patient, after one or several years.

This is the constant result of surgical operations performed in Pott's disease; I could quote hundreds of observations of this kind, but each of you will have known such in his own circle.

Doubtless, the situation is not the same in the case of superficial tuberculosis, cervical adenitis, idiopathic cold abscess, *spina ventosa*, osteitis or osteo-arthritis easily accessible, in which cases, if a fistula remain, the complete drainage of it does away with retention and reabsorption.

But do not conclude that operation may never be seriously harmful in cases of superficial tuberculoses. The danger of secondary infection does not exist here, it is true; but can we prevent the risk already pointed out of a tuberculous inoculation in the course of an operation, when, by the knife or the curette, the bacilli are brought in contact with vascular tissues thus harrowed and scraped? Inoculation will be spread by a **regional extension** of the tuberculosis, or by the **creation** of a new focus at a distance.

Here are some examples taken from a hundred such cases:

(a) A great Parisian surgeon performed castration for an **epididymitis** dating back two years, in a child of 13 years. Soon after the operation, exactly three months, there appeared a right coxitis, and in the fifth month the left hip followed suit.

(b) A little girl had, for three years, a double **spina ventosa** of the right hand. It was decided all at once to scrape it: nine weeks later Pott's disease appeared at two points (cervical and lumbar).

(c) A young man 24 years of age was brought to me for left **epididymitis** by his brother, who is a medical man. I proposed modifying injections (see Chap. XIX.) into the site. The treatment doubtless appeared very simple to my colleague, who went the next day to Paris to consult one of his old masters, a very distinguished surgeon, who performed castration. Two months afterwards, the patient was carried off by meningitis before even the operation wound was cicatrised.



And I know of three other cases exactly similar to that.

(d) Lastly, I hear from one of the surgeons who operate most frequently on appendicitis in Paris, that he has decided not to operate again on **appendicitis** when it is duly recognised as being **tuberculous**—because, having operated upon six such cases, he had seen two of the patients (the third!) carried off some months after the operation, by an attack of cerebral tuberculosis.

So much for the risk of tuberculous inoculations after operation, a danger I have no wish to exaggerate, which is, I will admit, not very great, but which cannot be denied nowadays.

We will take now the cases called “satisfactory,” those in which cure is obtained by operation; at what price is that cure obtained?

Do the mutilations produced count for nothing?

I do not refer to the loss of power left in children by operations on the bones of their limbs, but solely to the results obtained in those superficial tuberculosis which appear the most amenable to the knife.

In operating for cervical adenitis, you have avoided the risk of septic infection and tuberculous inoculation, you have obtained union by first intention, of which you are so proud; but is it then nothing, I ask those surgeons who operate upon cervical glands, is it nothing that you have left that young girl with **horrible cicatrices, persistent stigmata**, which will remain with her to the end of her days, a cause of infinite sadness, which will “mark” her for ever, will prevent her establishing herself and pursuing a normal existence?

And it is not a question only of fashionable young ladies; how many shop girls and domestic servants who, by the large cicatrices on their necks, are prevented from obtaining situations and gaining a livelihood!

Each of us must examine his conscience. We ought to think a little more of those children with Pott’s disease who have paid with their lives for the mistake of the practitioner who has opened their abscesses, or even more of those **young women**

with scarred necks, who have paid for that same error with their beauty and their happiness; I believe that the thought of that would make us accord, in course of time, rather less credit to cutting operations in the treatment of suppurated tuberculoses.

Remember that *tuberculosis does not love the knife, which rarely cures, often aggravates, always mutilates.*

**2. The value of abstention.**—Do not be astonished after this, if I affirm that to leave suppurated tuberculoses alone, to do nothing except a good general treatment, is far safer, on the whole, than to operate upon them. In other words, ***systematic abstention is preferable to cutting interference*** at all costs.

And I am not alone in this opinion. Has not a Professor of the Faculty of Paris the habit of saying that, in the presence of superficial tuberculosis, it is better to fold one's arms than to take up the knife? I have heard recently the same language at the Orthopædic Institute at Milan, where a surgeon said to me: "At one time we operated upon and scraped every abscess in coxitis and Pott's disease; now we never touch them, and our patients have gained much."

Indeed, if one does not touch them, this is what happens:

1. A large number of these tuberculous suppurations are reabsorbed—nearly half of them, a fact certainly not to be overlooked—and it is true, not only in superficial tuberculoses, but also in the abscesses of Pott's disease; it is indeed most frequent in the last case.

Nearly half the abscesses in Pott's disease are reabsorbed spontaneously, if you leave the subjects at complete repose with good general treatment.

2. The others open spontaneously maybe, but with spontaneous opening: (a) the risk of *tuberculous inoculation is negligible*, contrary to what occurs in scraping and cutting operations; (b) the risk of *secondary septic infections is less*

than in fistulæ following on operative interference, that is to say, fistulæ in which one has disturbed the tissues very much.

This is why the fistulæ which are produced in the neglected children of the provinces are cured much more often than those which are subjected to extensive and learned surgical interferences, fistulæ which are very often infected at the onset by the operative act.

(c) *Mutilation* is less after spontaneous opening than after operation.

The cicatrix in the neck, which the spontaneous opening of a broken-down gland leaves, will never, or scarcely ever, be so unsightly as the large and horrible scars going from ear to chin, or from one ear to other, of which the surgeons are so proud, all the more proud as the scars are longer.

**3. Puncture and Injection.**—But let us hasten to say that we have fortunately found something better than abstinence to set against the suppurated tuberculoses. If one sins especially gravely by commission (in operating), one sins also, by omission, in leaving an abscess to open spontaneously. It is necessary not only not to operate upon or to open tuberculous suppurations, but still more to **prevent them opening**, by puncturing them with a fine needle. And we will have already rendered a great service to our patients if we have saved them from the risk of mutilation, septic infection and tuberculous inoculation.

Therefore to do nothing should not be your motto.

There is a better way. If we know how to profit by the presence of an abscess cavity in order to replace the pus by a modifying liquid which will cure rapidly the tuberculous wall (idiopathic abscess), and which, in abscesses by gravitation, will rise up to the source of the pus and cure not only the abscess, but even the affected bone or articulation whence the pus comes, ah ! then, it will be truly perfect.

We shall have certainly cured our tuberculosis, more surely



than with the best conducted operation, and we shall have cured it in a few months; we shall have cured it without any danger and without mutilation (the most beautiful, æsthetic and orthopædic result). Here, then, is the **ideal** and dreamt-of **treatment**, until the anti-tuberculosis vaccine or serum has been discovered. Well, this treatment is not a myth, it already exists, as we have said: it is that of **punctures followed by modifying injections**, which not only always cure (ninety-nine times in a hundred) without risk and without defect, and cure relatively quickly (in 2 or 3 months); but more, it offers the advantages of an inestimable prize; it is very simple and easy; and it may be applied by all medical men, wherever they may be.

This is what one ought not to weary in repeating, until all practitioners are convinced, and until the treatment is included in current practice, as it merits to be.

All medical men will obtain the promised results, provided that they follow exactly the technique we have described. In spite of that technique being easy, there are nevertheless some details, the minute observation of which is indispensable.

I very often see practitioners who wish to treat by punctures and injections cases of suppurated tuberculoses and, being unsuccessful, think themselves obliged, in the end, to open or allow to open, the purulent collections. That happens because their technique is defective. You should follow what I have written, in every detail, in Chapter III.: it will give you success invariably.

## **2. Dry or pulpy tuberculoses**

The respective value of the three treatments (operation, abstention and injections) is the same for the dry tuberculoses as for those which have suppurated—with this difference, however, that in the tuberculoses which have **suppurated, injections** are of far greater value than abstention<sup>1</sup> and extirpation—whilst

<sup>1</sup> Apart from the case of **deep abscess** in **Pott's disease**, where **one ought to abstain** and wait for the spontaneous reabsorption of the abscess.

there remain **some cases** of **dry** tuberculosis where the **conservative** treatment and **surgical** operation may be **contemplated** although they are not, to my mind, to be preferred.

It is not then a question here of proscribing these two treatments, but simply of considering them as **exceptional treatments**.

We will proceed to state, in a few words, the exceptional indications.

**The value of purely conservative treatment.**—This treatment may cure a good number of dry or pulpy tuberculosis. It is not we, who live at Berck, who are going to contest this. But it can only be relied upon when the patients are able to live by the seaside or in the country; and when it cures, it is not, generally, until after a long time, three, four, five, six years, and even longer; it is an inconvenience that all those who employ it are obliged to recognise. To sum up, it is **too long**, consequently too costly, to be carried out in all patients.

But especially, it is **too uncertain**. Even under the best conditions, it does not cure much more than half the cases. In the other half, the disease progresses, the tuberculous lesion suppurates or goes on indefinitely.

These are sufficient reasons why the "purely" conservative treatment cannot be adopted as a general method of treatment.

It ought to be rejected, particularly when patients of the working-classes are in question, children or adults, and in the case of inhabitants of large towns who are not able to leave their unhealthy surroundings.

It is **admissible**, on the contrary, in a child belonging to a family in easy circumstances, who comes with a tuberculosis apparently benign, for example, a **hard adenitis**, or a **subcutaneous tuberculoma**. The parents are perturbed at the very suggestion of making the least injection; they declare that they are not in the least hurry, and that the question of duration is a secondary consideration to them. They will arrange for the child to live at the seaside for any length of time it may

be necessary, three years, four years, and more, under any conditions of hygiene and feeding that may be prescribed.

The parents are altogether wrong in dreading injections, quite painless, of course; but, after all, since they are not always indispensable for recent and benign tuberculosis, we can abstain at the beginning—we can have recourse to injections when the families themselves have exhausted their patience, or the malady becoming apparently permanent, the proof will be manifest to everybody of the inadequacy of pure conservative treatment in this particular case.

**The value of operative treatment.**—As to the *Operative treatment* of dry tuberculosis, a treatment which is still unfortunately that of most surgeons, we must not forget that, if it cure sometimes, it aggravates the condition often and mutilates always.

We have already pointed out the sad mutilations caused by the removal of cervical glands. We will take another example, that of white swelling of the knee. We will not mention amputation, which must be considered as a catastrophe, but only resection.

One ought **always to reject resection in subjects who have not completed their growth.** Everybody will agree that *if it is economic, it is insufficient* to cure the focus, and that it may, among other things, leave a fistula. *Performed extensively, it seriously mutilates* the subject by doing away with the articular cartilage, and that mutilation cannot but be aggravated later on. It follows that subjects, resected in their childhood, present at manhood 10 or even 15 cm. of shortening.

Although the inconvenience of arresting the growth in an adult does not exist, it follows that, in the adult as in the child, cutting operations performed to get rid of the tuberculosis carry with them the risks of permanent fistula, without counting the possible danger of bacillary generalisation.

Nevertheless, operative treatment is admissible in some



special cases, for example, that of an **adult workman** suffering with **dry and fungous white swelling of the knee**. There is here no question of growth, which might arrest us in such a case. On the other hand, *this man is obliged* to return to his work. Instead of applying to him the ordinary treatment of modifying injections, which would take from eight to twelve months to effect a cure, very often with ankylosis, we may resect at once ; the resection gives us a passable functional result, and reduces the duration of the treatment by one-half, **provided, however, that all goes well**, that is, if after having removed the whole of the contaminated tissues, we have obtained re-union by first intention.<sup>1</sup>

Outside these exceptional indications, we always fall back upon the injections in the treatment of hard and fungous tuberculoses.

### **Injections the best Treatment for dry Tuberculoses**

#### *How are injections able to cure dry tuberculoses ?*

There are two methods of cure of tuberculous lesions : the sclerosing transformation, and the softening, with subsequent evacuation.

The injections act in bringing about one or other of these modifications.

They cure sometimes like the purely conservative treatment, sometimes like the surgical treatment ; that is, by hardening the fungosities, or by liquifying them, by which means their expulsion out of the organism is rendered possible (by means of puncture).

This depends upon the liquid injected.

<sup>1</sup> It would be the same in a case of tuberculous lesion of the soft tissues, easy to isolate, where extirpation can be effected very completely without danger of fistula or visible cicatrix (that is, in an unexposed situation ; for example, an axillary or inguinal adenitis, or a subcutaneous tuberculoma in a working man.

But it is still preferable, in the last case, to abstain from all operation and to allow matters to go on, keeping the subject under observation ; he might even continue at his work. Either the lesion is reabsorbed, or it softens spontaneously, in which case one would immediately perform the puncture.

The first method of cure is carried out by **injections of the "drying type"**; that is, those which do not produce softening; for example, iodoform and creosote.

The second by **injections of the "liquefying type,"** those which cause softening of the fungosities and the formation of an effusion; for example, naphthol camphor.

The injections of the liquefying type are most efficacious and certain, because they permit of the complete evacuation of the tuberculous products by the very small orifice of an aspirating needle, without any risk of fistula or tuberculous generalisation which always follows in the train of surgical operations.

It is therefore the most rational treatment, that which accords best with the indications of bacteriology and of clinical surgery: the first calls for the expulsion of the tuberculous products out of the body, the second demands that it should be done without any damage to the patient; a treatment which has already been put to the test in several thousands of cases—a treatment, simple, although very accurate.

Ah, yes! **very accurate**; and we ought to repeat as to the injections what we have already said as to the punctures, namely, that the treatment demands, **in order to give the promised results**, to be done according to a perfect technique and not haphazard, as if the liquid, the dose of the liquid, the number of injections, were of no importance. The number of injections may be from 12 to 15—this means that the treatment is somewhat exacting.

A slight inconvenience, on the whole, if one has regard to its advantage and its results! However, and once again, cure is the prize! And "where there's a will there's a way."

We have already given an account of the technique, with all necessary details, on page 165, and we will return to it *à propos* the treatment of dry or fungous tuberculous arthritis (page 159), and also the treatment of hard adenites, and cutaneous or subcutaneous tuberculomata (Chapters XVIII. and XIX.).

**On our Method of Softening artificially the Dry  
Tuberculoses.**

*I.—The Principle involved.*

It is admitted that suppurated tuberculosis is essentially of graver import than dry or fungous tuberculosis. We agree with that<sup>1</sup>; but, on the other hand, it is certain that we are to-day better armed against suppurated tuberculosis than against dry tuberculosis; so that the advantage is on the side of the former, and on the whole it would be better to have a cold abscess than a tuberculoma.

I will explain myself.

A young lady came to me with a suppurating adenitis; this we knew we could cure (with punctures) in a few weeks, completely, without mutilation and without cicatrix.

As a set off, a second young lady came with a "simple" hard adenitis, for which we learned, as happens too often, every treatment had been useless; nothing had succeeded: neither the sojourn at Berck for a year or two, nor the well-known medicines, nor sclerosing injections of creosote and iodoform. This hard adenitis would not be cured. It remained only to operate upon it, but operation mutilates, operation leaves an unsightly cicatrix which is, in the eyes of the world, the infamous and inefaceable sign of scrofula.

You see, when all comes to all, the fate of the first young lady, with her cervical abscess, is much more enviable than that of the second, with her hardened gland, so-called more benign.

In the presence of this hard, persisting adenitis, we could but regret that it would not suppurate. There would have been, by the fact of its suppurating, more to gain than to lose by a patient treated by a medical man knowing how to make a puncture.

But alas! in spite of all our desires the adenitis would not suppurate at all.

Why not force it to do so? Why not force this tuberculous gland, and, further than that, all the hard tuberculoses, to soften

<sup>1</sup> In spite of the fact that this may not be absolute, nor applicable to all cases (as we have already shown in our book: *Les Maladies qu'on soigne à Berck*, pp. 70 and 80, to which we refer you for this discussion).



artificially : synovites, osteo-arthritis, epididymites, which will not reabsorb ? Yes, let us seek for the suppuration of the tuberculomata. That is what we dared to say 20 years ago !—we were told then that it would be madness.

We have persevered to the actual realisation of our ideas.

## II.—*The Technical Problem to be solved.*

Artificial softening of hard tubercloses without injury to the patient is a problem difficult to solve, in which you see very well there are two aims : to act upon the tuberculous lesion with extreme energy, since it consists in making it pass from a solid into a liquid condition, but, however, with extreme precision, so as to limit the action on the gland or the lesion, without causing ulceration, and without leaving visible traces of the interference.

In order to do this, we have tried everything.

1st. The local application of **all known remedies**, solid and liquid, so-called **fondants** and **maturatives** : pomades, ointments, various cataplasms, compresses of sea water hot and cold, thermal and mineral waters, balneo-therapy, radio-therapy, electricity in every form. But the results obtained by these means have not been truly satisfactory.

2nd. All the **internal medicines** conceivable : tincture of iodine, Fowler's solution, alcoholic extract of water hemlock, that especially, because Bazin recommends it : " in small doses hemlock may cause the reabsorption of tuberculous glands : or, by raising the dose, their softening." How gratifying it would be were it true ! Unfortunately, that medicine has not given us the promised results.

3rd. We then attempted, with needles, the **discission** of the gland (as is done for cataracts) in order to prepare and facilitate its ultimate softening or reabsorption. We tried **to break up** the tuberculoma with fine curettes, with cutting blades in the form of scissors, introduced closed and then opened. But the results were incomplete, and, on the other hand, the passage and manœuvring of these cutting instruments left visible traces on the skin.

4th. **Intra-glandular injections** of innumerable different substances : tincture of iodine, salt water, either mineral or thermal, solution of chloride of zinc, culture of staphylococcus and of streptococcus, previously sterilised, tuberculin (on the advice of Professor Calmette). We have tried to produce the digestion of the gland parenchyma by injections of pepsin and particularly of

pancreatin (because it acts in a neutral medium). But it is almost impossible, however, to have solutions of pancreatin at the same time quite aseptic and moreover active. Injection of oil of turpentine yields, it is true, about the third or fourth day, some aseptic supuration, but it is extremely painful and often causes scars. We have injected the whole series of camphorated phenols; naphthol, gaiacol, thymol, salol, camphor, sulfuricinated phenol, etc., but the injections either did not produce softening or they ulcerated the skin.

Finally, that which did best in bringing about the desired result were the injections already indicated in the chapter on Technique, p. 165; namely, for the treatment of fungous arthritis, injections of naphthol camphor and glycerine, and for the treatment of a small tuberculoma and adenites, injections of our **fondant of four liquids**, mixed in equal parts—sulfuricinated phenol, camphorated phenol, camphorated naphthol, oil of turpentine. You will find on pp. 163 and 165, the method of using the one or the other of these “fondants.”

To **recapitulate**: our method consists in transforming the hard adenites and tuberculomata into small cold abscesses, which are then punctured: in altering tuberculous arthritis, by the action of chemicals on the fungosities on the internal surface of the synovial membrane (the effect realised by our injections) into hydrarthroses or pyarthroses, which are treated afterwards as ordinary cold abscesses.

Therefore, cold abscess, that enemy formerly so terrible, has been changed by us into a very precious auxiliary which allows us to predict and ensure the cure of external tuberculoses. And you understand now in what sense we were able to say: When cold abscess does not exist, invent it—create it.

We will return, in the course of this book, to the divers applications of this doctrine, everywhere accepted and applied to-day; but we say now, that we have gained the most beautiful results, which theory promised (see p. 498, Statistics of White Swellings, as treated at our Hospital Cazin at Berck). See also the observations upon cases in the Appendix to Chap. XVII. on Cervical Adenites).

***Tuberculous Fistulæ, and Tuberculous Sores  
or Ulcers***

What we are about to say here is applicable to all **tuberculous fistulæ**.

As to the peculiarities of the different fistulæ, they will be studied in the chapter devoted to each external tuberculosis (see Pott's disease, white swelling, adenitis, osteitis, epididymitis, etc.).

Fistula arises from the opening—**surgical** or **spontaneous**—of a tuberculous focus. Fistula is the enemy and the black spot in external tuberculosis: it is the nightmare of all those who are occupied with these affections.

If we have condemned operative treatment for almost the whole of the cases of external tuberculosis, it is because **operation** so often leaves a fistula behind it.

If we have described with so many minutiae the technique of puncture and injection, it was so that you might be able to **avoid** fistulæ.

For fistulæ are so difficult to cure that the *preventive* treatment remains the best.

It is for this reason that I would have the following inscription graved on the front of hospitals where the external tuberculosis are treated:

**“The cure of closed tuberculosis is certain. To open tuberculosis or to allow them to open is to make a way through which, very often, death will enter.”**

The *danger of death* may be but slight, except in the symptomatic fistulæ of *deep* osseous and articular lesions (and more particularly in hip disease, and especially Pott's disease). But the *superficial* fistulæ themselves are always *troublesome*, not only by the unpleasantness which every persistent suppuration causes, but still more by the mutilations and blemishes, which they may leave behind them. For example, the hideous and



indelible cicatrices left by glandular fistulæ in the cervical region, without reckoning the risk of inoculation (if it be but small) arising from the persistence of an active tuberculous focus, even when superficial.

Nevertheless, if among fistulæ there are certain which kill, whilst others are merely disagreeable from the amount of supuration they cause (with, between the two, every degree of gravity); a classification of the different varieties has to be made.

### Classification of Tuberculous Sores and Fistulæ

1. *Tuberculous sores and ulcerations of the SKIN.*
2. *Fistulæ symptomatic of the lesions of SOFT TISSUES.\**

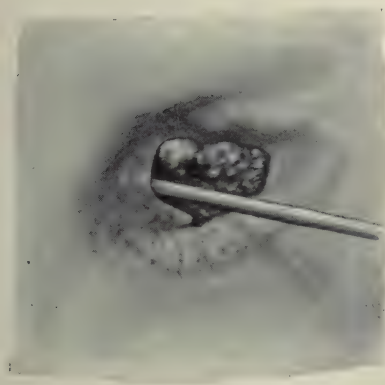


Fig. 177.—Tuberculous ulceration of the skin: a large orifice, with exuberant fleshy granulations protruding; margins of a violet colour, skin delicate, sloughy (a probe has been introduced to raise it); the adjoining tissues are uneven, lumpy.

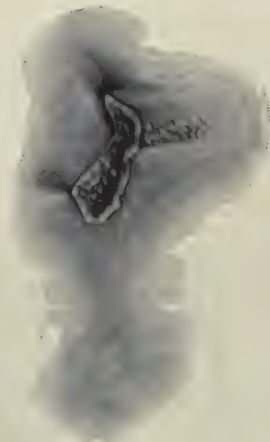


Fig. 177a.—The process of cicatrization; the ulceration is dried, covered with a greyish or blackish crust, which persists; the integument around remains for a long time lumpy and coloured.

3. *Fistulæ symptomatic of SUPERFICIAL OSSEOUS and ARTICULAR lesions (that is, where drainage is easy).*

4. *Fistulæ symptomatic of OSSEOUS or ARTICULAR lesions, DEEPLY placed (that is, where drainage is difficult).*

**1st Group.**—Tuberculous Sores and Ulcerations of the Skin.—It is a question here of lesions on the surface rather than real fistulæ, for there is not any track leading from the cutaneous ulcer, or if, sometimes, a sinus exist, it remains subcutaneous through its whole length; it is a simple *undermining of the skin rather than a true fistulous track.*

These sores follow *cutaneous or subcutaneous tuberculomata.*

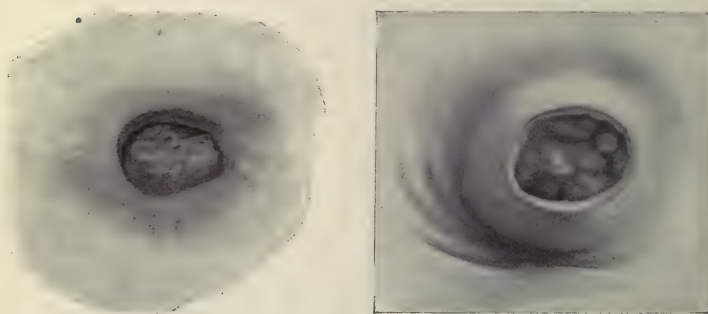


Fig. 178 and 178a.—Types of syphilitic gummatous ulceration, surrounded by sharply cut perpendicular edges.

You well know the typical characteristics of such sores, namely: their edges are thin, violet coloured, irregular, undermined, their bases yellowish, with small caseous points or fungosities (fig. 177 and 177a).

On the other hand, syphilitic sores have rounded edges—cut perpendicularly—punched out—cliff-like, with a base the colour of ham, or of a gummy appearance (fig. 178 and 178a).

But fairly often these differential **characteristics** are much **less definite**, confusion is possible between the two, so much so, that there are mixed forms—scrofulides.

Even while still in the domain of tuberculous lesions, one can see intermediate forms between microbic ulcers of the skin and tuberculous lupus.

However, we shall have the opportunity in another part of this work (see Chap. XIX.) of speaking about tuberculosis of the skin.

**2nd Group.**—In this group, and in the following ones, it is a question of true fistulæ, that is, sores which are nothing more or less than small craters through which, coming to open through the skin, are tracks and deep cavities, and ending in tuberculous lesions of the soft tissues or even of the bones.

The second group is that of fistulæ symptomatic of lesions of the soft parts.

For example, fistulæ of the neck, of the axilla, of the groin, symptomatic of *tuberculous adenitis* (fig. 179 and 180) Or fistulæ of the scrotum, symptomatic of *tuberculous epididymitis* or *orchitis* (fig. 184).

Or, fistulæ of the hand or of the wrist, symptomatic of *pulpy synovitis of the tendons*, or of *tuberculosis of the synovial sheaths*.

**The 3rd Group** comprises the fistulæ symptomatic of tuberculous lesions of the **bones**, but **SUPERFICIAL** lesions, that is, fistulæ with short tracks, which can be, consequently, easily and completely drained.

For example, the symptomatic fistulæ of a *spina ventosa* of the fingers or toes; a tuberculosis of the malar bone, of the *frontal bone*, of the *maxillæ*, of the *clavicles*, of the *ribs*, etc.

In this group again are found the symptomatic fistulæ of superficial osteo-arthritis, that is, almost the whole of the fistulæ of the *elbow*, of the *wrist*, of the *ankle*, of the *shoulder*, of the *knee*.

This group also includes a certain number of fistulæ of *Pott's disease*, those which fulfil, from the point of view of



FISTULÆ ARISING FROM SUPERFICIAL BONE LESIONS

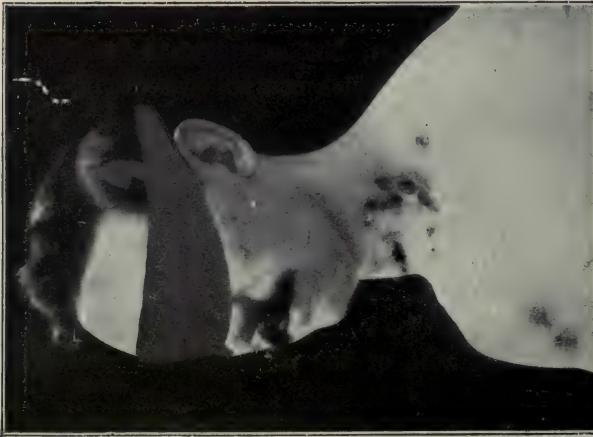


Fig. 179.—Old fistulæ of the neck due to tuberculosis of cervical glands. Condition of patient on his arrival at Berck (see following figure).



Fig. 180.—The same case cured at Berck in five weeks by sea air and our treatment—the application of our powder and compresses steeped in our paste for fistulæ. He presents only a minimum of scar. No operation could produce so fine a result as that obtained by this conservative treatment. Operation might dispose of the fistulæ, but it would certainly leave scars a hundred times more visible.



Fig. 181.—Blanche D., 17 years of age. Shoulder riddled with fistulas, due to tuberculosis. (See the two following figures.)



Fig. 182.—The same; view of the back. Condition of patient on arrival at Berck.

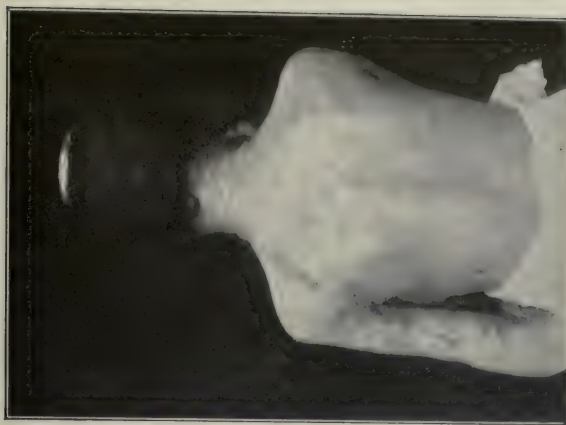


Fig. 183.—The same after cure. View of back.

facility of drainage, the conditions aforesaid, namely, fistulæ which open in the neck, or on the back, at a point *very near* to the vertebral focus.



Fig. 184.—Fistulous opening from a tuberculosis of the testicle opened spontaneously; this figure shows the state of the lesion after a stay at Berck. On his arrival, the patient had two other fistulæ on the **right side** of the scrotum still larger and with a graver appearance; we cured them by the paste injections. Those on the left side “dragged along” but are in a good way towards cicatrisation and no doubt complete cure (without operation). The unusual delay in the cure of these last fistulæ is explained by the co-existence in the patient of Pott’s disease and a suppurating costal osteitis. But, in spite of the multiplicity of tuberculous localisations, the patient is so much ameliorated and transformed, that his complete cure is certain and is only a matter of time; about another year’s stay at Berck and local treatment.

Let us say on this subject that **all the other** scrotal fistulæ, 65 fistulæ out of 200 cases of tuberculosis of the testicle or of the epididymis (which we have seen during 18 years) have been cured by my injections in a period which has varied from one month to a year. The case here represented has been by far the longest of all to cure. The cure of this patient is to-day complete. (See end of this observation in Additional Notes, p. 1010.)

**The 4th Group** embraces the fistulæ symptomatic of tuberculosis of the **bones**, but a tuberculosis **DEEPLY**



SITUATED—that is to say, fistulæ with long tracks, where drainage will be much more difficult than in the preceding cases.

For example, the fistulæ symptomatic of hip disease, the fistulæ of *Pott's disease*, apart from the exception mentioned above.



Fig. 185.—The same (fig. 184) completely cured.

And, on the other hand, there may be exceptionally placed in this group certain fistulæ symptomatic of white swelling of the knee, of the shoulder, of the wrist, of the ankle—namely, those fistulæ which have a long and tortuous track, rendering drainage and the discharge of pus particularly difficult.

### Prognosis.

The first three varieties are *curable*, the fourth *not always*—far from it.

Why? It is because fistulæ of the first three varieties are seldom infected, or because their *infection* yields easily to the means of treatment, whilst fistulæ of the fourth group are *very often infected*, infection superadded and so grave that we cannot always master it.



Fig. 186.—Ulceration of the anterior surface of the leg. The clinical signs on the arrival of the patient, as well as the radiographic examination, suggest almost the diagnosis of osteo-sarcoma (of an osteo-sarcoma, mind you). But the bacteriological examination (by M. Noel Fiessinger) revealed the presence of Koch's bacillus. Cicatrisation is now obtained. See end of this observation in Additional Notes.

Therefore, that which constitutes the gravity of a tuberculous fistula is its possible infection; and the first question to put, in the presence of a fistula, in order to establish its prognosis and its treatment, is whether or not it is infected.

*Infected* you may say it is, when the original tubercle bacilli are mingled with *septic germs which have come from without*.

The tuberculo-septic pus has been retained—which is somewhat rare in fistulæ of the first three groups, but very frequent in the anfractuous and deep sinuses of those of the fourth group ;



Fig. 187.—The same completely cured. In place of extensive ulceration only a small cicatrix remains. The patient can move the knee freely. On arrival at Berck the joint was swollen and stiff, so that the doctor pronounced it a white swelling, whilst consultants concluded it was cancer. In the end the cure to-day is complete from the functional as well as the anatomical point of view.

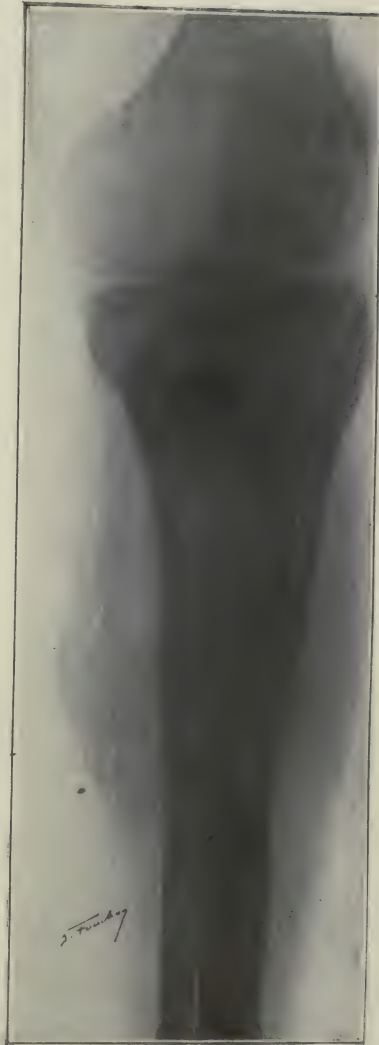


Fig. 188.—Radiogram of right tibia; the bone is irregular, full of lacunæ, its edges are jagged, a globular mass fills up the soft tissues: one thinks of an osteo-sarcoma.



this pus will be absorbed by the organism, it will cause fever and poison the patient.

If the duration of the retention and absorption is short the patient will recover.

But if it is prolonged, it will lead to a progressive intoxication of the organism, a real chronic septicæmia with degeneration of the liver and kidneys. And the ending of infection of the fistula will mean the death of the patient, a consummation more or less distant, which may be measured by months or even several years.

Fortunately, we repeat it, all the initial infections do not end in this way.

We are able to distinguish three degrees or phases in infection.

*The first degree* is characterised by an evening rise of temperature with morning remissions; the fever has appeared only for a few days or a few weeks; analysis does not yet reveal any trace of albumen in the urine.

*The second degree* is characterised by the appearance of a little albumen; and the albumen appears, as a rule, when the fever persists beyond a few weeks.

*The third degree* is characterised by the presence of a *notable* amount of albumen and by an appreciable enlargement of the liver, which reaches to at least a finger's breadth below the false ribs. Fever may no longer exist at this moment.

Besides these principal signs there are others, those which constitute the cortège symptomatic of slow intoxication of the organism, namely, loss of appetite, loss of strength, wasting, pallor, a yellow or dirty-white tint of the face, fetor of the pus, the appearance of partial or generalised œdema, etc.

As to the **prognosis** of *infected fistulæ*, this differs according to the degree of infection.

The first two degrees are curable, provided that you succeed—by proper drainage—in overcoming the retention of pus.

Unfortunately, perfect drainage is not always realisable in

Pott's disease or hip disease ; it is for this reason that one cannot promise, absolutely, the cure of an infected fistula, even of the first degree, symptomatic of hip disease or Pott's disease.

Sometimes the fistula will progress, in spite of all our efforts, to the third degree.

And in the third degree the disease is without remedy, or

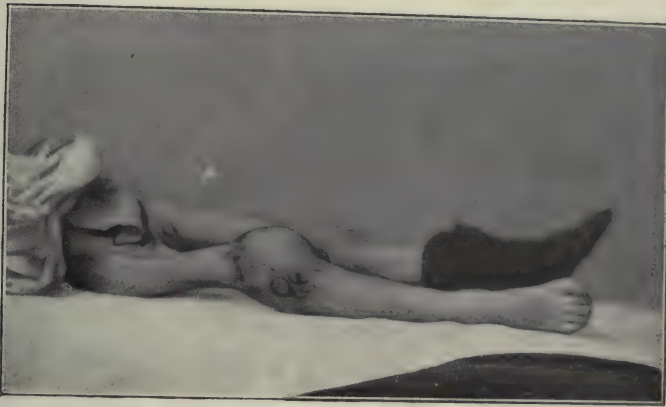


Fig. 189.—Osteo-articular tuberculosis of the knee. The condition of the patient on his arrival at Berck. Lesions extremely advanced, accompanied by profuse and fetid suppuration. General infection of the organism, evening fever, albuminuria, cachexia. Immediate amputation was the last chance (a very small one !) of safety to resort to ; the parents refused. The little patient returned to his home and succumbed in two months.

pretty nearly so, when albumen exists in notable quantity ; when the liver extends two fingers' breadth beyond the costal margin, it is too late. Then, even if one drains extensively, even if one succeeds in producing a fall in the patient's temperature, the visceral lesions will continue to progress to their full extent and will finish by carrying off the patient—always or nearly always.

### The Treatment

Every six months you will hear vaunted a new treatment, so-called marvellous, of tuberculous fistulæ.

All these treatments, new and old, may be arranged in four groups: *surgical operation, abstention, physio-therapeutic treatment and injections.*

(a) **Operation.**—To a great number of surgeons (to the greater number, I should say) the only rational treatment of tuberculous fistulæ remains, to-day as yesterday, surgical opera-



Fig. 190.—Another case of post-operative fistulæ. This patient arrived at Berck in this condition with fever, albuminuria (8 or 10 grammes a day) large liver, general cachexia; he lived two years longer. He succumbed lately after an uræmic crisis.

tion, an operation which they perform very extensively and which they repeat without wearying.

Certainly it appears, *a priori*, logical and rational. But in fact and in practice, experience has proved to us that operation has done twenty times more harm than good. Instead of destroying by a single stroke the tuberculous focus as had been hoped, one might say, as a general rule, it stirred up the



focus and thereby opened up tissues which until then were sound ; it does not cure the patient, it mutilates him.

I say nothing of inoculation far away in the meninges or in the viscera, and of tuberculous generalisations, which operations may bring about.



Fig. 191.—Fistula communicating with a deep, bony focus (Pott's disease in lumbar region) : the fistulous orifice was found within four inches above the centre of the left iliac crest ; an injection of very soft iodoform paste before the photograph was taken shows the different diverticles of the collection.—T. Tampon obstructing the fistulous orifice—I. Focus and principal cavity of the abscess filled with iodoform liquid—P, P, P. Secondary pockets—one of these descends, on the right side, down to the internal iliac fossa ; one conceived that there was very poor assurance of perfect drainage with a sinus so anfractuons. If fever appears, or if the cure takes too long, a counter opening will be indicated at the lowest point.

Recall our aphorism : *In tuberculosis the knife rarely cures : it often aggravates and always mutilates.*

At the commencement of my practice, I operated and re-operated upon hundreds of fistulæ ; I obtained, doubtless, some

cures, but many more aggravations. So much so that I treat them to-day by the conservative method ; I operate no longer ; all that I do now as an operation, if it may be called a real operation, is, in the **extremely rare case** where I find by examination of the sinus a **mobile sequestrum**, to **extract it**—**without doing more**, without touching the sinus.

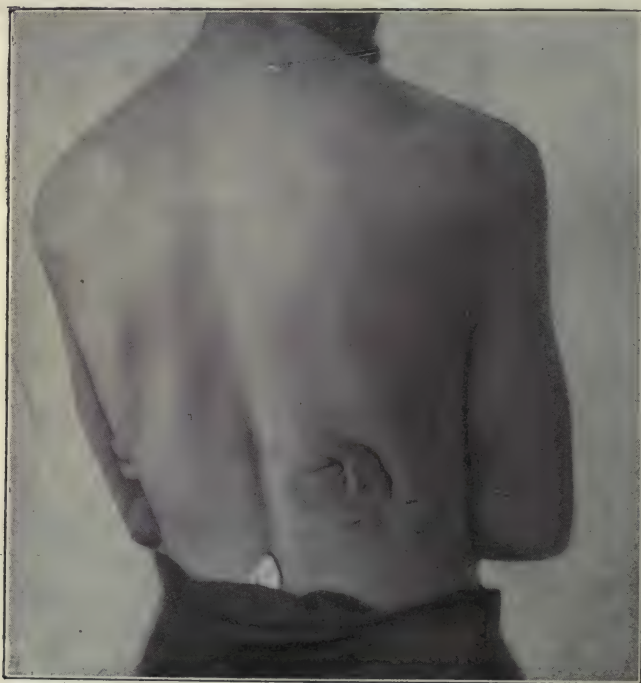


Fig. 192.—These fistulæ, of three years' standing, proceeding from a tuberculous pleurisy (empyema), have been cured by a single injection of our naphthol paste.

The cures effected by my conservative treatment to-day are incomparably more numerous and more satisfactory than those obtained by my treatment by operation years ago.

The question has been settled, the only treatment of tuberculous fistula should be conservative.

You may rely on my very great personal experience of the two methods.

Once again, do not allow yourself to be troubled by the thought that there may be small sequestra, an objection which will often be made to you by the advocates of "operation at all costs."

First, sequestra here are very rare. I have said so, but



Fig. 193.—Fistulæ proceeding from hip-disease ; these fistulæ, of eighteen months standing, have been dried up by six injections of our paste in the space of two months.

supposing they do exist, it is in the two following conditions:—

Either (a) you find the sequestrum already *completely detached, easily accessible*, and it is evident, as we have said, that you can and ought to seize it with the forceps, just as you would any foreign body ; but be contented with that ; you can do it without anæsthesia and without causing hæmorrhage. Or,



(b) the sequestrum is not mobile or is not easily accessible ; well, abstention, in that case, would be better than operation.

For sequestra are worn away and eliminated by the aid of injections, and even spontaneously, in the long run—nearly always.



Fig. 194.—Symptomatic crural fistulæ in a case of dorso-lumbar Pott's disease. The fistulæ, which had existed a year and a half, were cured in four months by our paste injections.

In abstaining, you observe *primo non nocere*. Whilst operation will not be without danger.

(a) For if you have recourse to a very extensive cutting operation, so called radical, you run much risk of extending (in place of limiting) the region affected by the tuberculosis ; it will produce new sequestra, and the only result of the operation

will be an aggravation, a mutilation. The patient will be mutilated, even when the tuberculosis is superficial.

For example: if you curette a finger affected with spina ventosa, to be quite certain you have reached the limits of the disease you will have to go beyond it and cut into sound tissue; you will unavoidably go too far, and thus the patient will come



Fig. 195.—Another case of cured fistula in Pott's disease. The patient, aged 52, had a large abscess in Petit's triangle. The abscess had been punctured and injected already three times when the patient was obliged to leave Berck and suspend the treatment for several weeks. On his return, the skin was of a violet tint, almost black at two places, and a few drops of pus issued through orifices of the calibre of a pin. It was impossible to avert the opening which occurred in about two days by the giving way of two small scars in the skin; we recommenced our injections; the sores were closed again in about four weeks and have remained so. (This was over six months ago.)

away from the operation more mutilated than if he had waited for the **spontaneous elimination of the deepest osseous débris present**. Nature, in the end, will manage things much more economically than the surgeon.

(b) **Abstention**, then, is of more value than surgical

operation. That is, a patient placed at rest, in the pure air of the country, and especially near the sea, with good general treatment and no other local treatment than good aseptic dressings, has much more chance of seeing his fistulæ close than by operation. That is to say, again, that the country practitioner who never operates, will cure more patients than the great surgeon who always operates and obstinately re-operates. But I am teaching you nothing: have not every one of you seen a great number of those fistulæ cured, which had never been operated upon?

(c) **Physio-therapeutic Methods.**—What has not been tried, since Bier's method,<sup>1</sup> the X-rays, sunlight cures, violet rays, radium, up to sea bathing at our shores on the North and on the South, and salt baths, either mineral or thermal, at all the reputed stations: Salies, Kreuznach, etc., etc. These medications are not without value, they may succeed in very superficial fistulæ, and especially in ulcerations and tuberculous sores on the surface, acting by improving the general condition of the patient.

I have tried all of them, and have sometimes effected a cure, but infinitely less frequently than by the injections I am about to describe.

(d) **The modifying injections,** made with the liquids indicated, and in the manner described on p. 170. With these injections cure may be obtained almost always, even in the osseous fistulæ, provided they are not infected, and provided that one does not neglect any of the general indications given.

We will now indicate the treatment of each variety of tuberculous ulceration and fistula.

### 1. The Treatment of Tuberculous Sores and Ulcers

They are cured with different **topical** remedies, varying their use: the application of our powder,<sup>2</sup> tincture of iodine,

<sup>1</sup> Bier's method, of which I have said that it has no action against the bacilli, may act favourably against staphylococcal or streptococcal infection.

<sup>2</sup> See the formula of our powder, p. 157.



peroxyde of zinc, compresses soaked with iodoform creosote and oil, camphorated naphthol with glycerine, permanganate of potash, the application of Vigo plaster (fresh), nitrate of silver, the thermo-cautery, the galvano-cautery, dressings of oxygenated water or naphthalan.

**Physio-therapeutic Treatment.**—X-rays, and high frequency currents (these two can hardly ever be used except by specialists), exposure of the sore to sunlight, proceeding gradually and methodically, sometimes sea-baths, salt baths.

In cases somewhat refractory, I have made a circle of modifying injections all round the tuberculous sore (injections of creosoted oil or of naphthol-camphor).

## **2. Treatment of Fistulæ of the Second Group**

(Those connected with the Soft Tissues)

Make small injections of oil, creosote and iodoform, or of naphthol-camphor, but making provision for keeping the liquid in position. If the liquid is not easily kept in position, use our paste according to the technique and dosage you already know (p. 171).

## **3. Treatment of Fistulæ of the Third Group**

(Those Connected with Bone by Short Sinuses)

Make the same injections and in the same manner as above.

## **4. Treatment of deep Fistulæ**

(Hip Disease, Pott's Disease.)

(a) **If they are not infected**, if there is no fever, no albumen, make modifying injections as above.

(b) **If they are infected**, with evening fever resulting from the retention of pus, do away with the retention by simple drainage. If you do not succeed thus, avoid the injections. Avoid still more especially the temptation of extensive surgical interferences, so-called radical, which have twenty times more chance

of injuring the patient than of improving his condition. Confine yourself to a treatment, perhaps more modest, but incontestably better, which is : ensure the rest and immobilisation of the affected part with fenestrated plasters, asepsis of sores as perfect as possible, and now and then attempt discreetly, and for a short while, some of the physio-therapeutic methods. In addition, a good general treatment. The general treatment, so important here, comprises life in the open air, in the country, or, better still, at the seaside ; a properly chosen dietary, which includes plenty of milk ; and thus you may be able to prolong the patient's life for several years, sometimes you may cure him. We have cured some in this way, even cases of extreme gravity, and we have witnessed veritable resurrections. One must never despair.

But too often, however, we remain powerless, and death will be the usual termination of these profound infections in hip disease and more especially in Pott's disease. And for that reason, I can never repeat too often the fundamental dogma of the treatment of external tuberculosis : "*Never open, nor allow to open, tuberculous foci.*"

## CHAPTER V

### POTT'S DISEASE

#### *Some Anatomical and Clinical Points to be remembered in treating Pott's Disease*

Pott's Disease is a tuberculosis of the vertebral column. The lesion is situated in the anterior part, or the **bodies** of the vertebræ (fig. 196 to 199).

The objective in treatment should be to cure without a curvature. In order to cure, do not open any abscess.

To cure without a curvature, make good plaster corsets.

**Five Cases.**—*First Case:* **Before a gibbosity** has appeared (fig. 196). Like all the white swellings, Pott's Disease goes on for some time, several months and even one or two years, without deformity or gibbosity.<sup>1</sup> It may remain unobserved, but generally it makes itself known by some radiating or local pains, intermitting, or by a functional weakness, accompanied by reflex muscular contractions, defective walking, difficulty in stooping, rapid fatigue, etc.

*Second Case:* **Gibbosity** (fig. 196 to 199). Second period of the disease.

But we rarely see children during the first period. **Most often**, when they are brought to us there is **already a gibbosity**. This is produced : (a) by flexion of the spine ; (b) by the collapsing of one or two vertebral bodies, softened by the ravages of tuberculosis ; (c) sometimes by sub-luxation of two spinal segments.

<sup>1</sup> Pott's disease may even *never present a gibbosity*, but that is infinitely rare in children, rather less rare in adults.



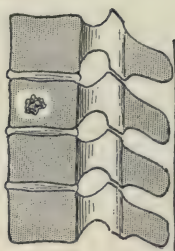


Fig. 196.—Pott's disease *before gibbosity*. A tubercle has appeared in the centre of the body of a vertebra; around this, a zone of rarefaction and softening favouring its extension.

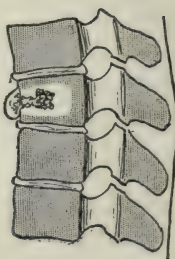


Fig. 197.—*Beginning of the gibbosity*. The tubercle has progressed, perforated the anterior wall of the body and produced an abscess; the vertebral body collapsed, hence the gibbosity is produced behind.

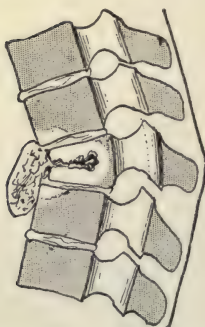


Fig. 198.—*The gibbosity accentuated*. The tuberculosis has progressed from one vertebra to the others above and below, which are beginning to soften and to sink.



Fig. 199.—*The gibbosity has progressed* at the same time as the anterior lesion. Of the first diseased vertebra only the posterior arc and an insignificant part of the body remain. What is left of it is by degrees pushed backward by pressure of neighbouring vertebrae, as is the stone of a cherry when you squeeze the fruit between your fingers.

*At the outset, the gibbosity is angular, in the middle line, and painful on pressure.*

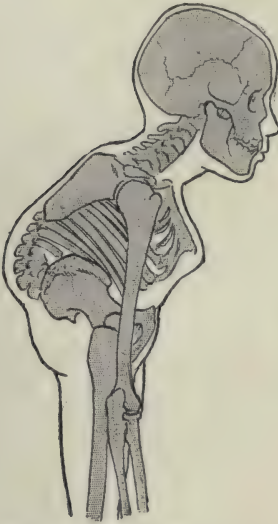


Fig. 200.—Last stage of a gibbosity. The patient has become a hunch-back (when he has not been treated or not well treated).

The figures 197, 198 and 199 show how a gibbosity is produced. It progresses; later on appear adaptations, that is, secondary deformities of other parts of the spine, and even of the thorax, of the pelvis, of the head, all

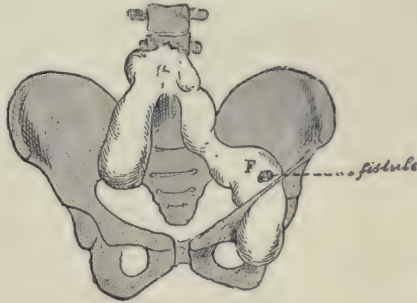


Fig. 201.—Abscess and fistula in Pott's disease. Abscess by gravitation in the iliac fossa. On the left, an abscess has travelled down to the thigh, passing in the shape of a wallet, beneath the crural arch. F. Orifice of a fistula above the crural arch.

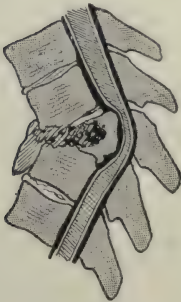


Fig. 202.



Fig. 203.



Fig. 204.

The three principal causes of paraplegia. Compression of the cord.  
1st, by a projection of bone. 2nd, by an abscess. 3rd, by pachymeningitis.

deformities which contribute to giving to the humps their characteristic outline (see fig. 208).

The gibbosity is generally less in Pott's disease of the cervical and lumbar regions than of the dorsal region.

*Third Case: Abscess. Fourth Case: Fistulæ* (fig. 201).—



Fig. 205.—Pott's disease from its commencement. Slight projection of the spinal apophysis of the sixth dorsal vertebra.



Fig. 206.—Gibbosity at the fifth dorsal (at the beginning).

The bacillary focus does not remain localised in the bodies of the vertebræ: it may invade the neighbouring soft parts and send prolongations of fungous branches more or less far towards the neck, the thorax, the back, but *especially* towards the lower parts:



internal iliac fossa, root of the thigh; and the softening of these prolongations constitutes the Psoas abscess of Pott's disease.

These abscesses, rare in Pott's disease of the upper dorsal region, are more frequent in Pott's disease of the cervical region, but almost constantly present in lumbar and dorso-lumbar.

They may go to the length of ulceration and breaking down of the skin, hence the formation of *fistulae* which are so easily infected :



Fig. 207.—Ordinary type; median and angular projection; the attitude in cervical Pott's disease.

this infection is very grave, leading to the degeneration of the liver and kidneys, and is very often fatal. **Fistula** is the **greatest danger** which menaces the life of these patients.

*Fifth Case: Paralysis* (fig. 202 to 204).—The fungous prolongations may be directed also towards the spinal cord. The compression produced by the abscess (fig. 213) will then give rise to

a paralysis more or less complete. The paralysis may be due also to a projection of displaced bone (fig. 202) or to a propagation of the tuberculosis to the meninges and cord (fig. 204) or to some trouble of the vascular or lymphatic circulation in them.

In contrast to gibbosity and abscess, paralysis is more frequent in Pott's disease of the dorsal and cervico-dorsal regions than in Pott's disease of the two extremities of the spinal column.

Of the three great symptoms, gibbosity, local abscess and paralysis, the first (gibbosity) is nearly always present; abscess



Fig. 208.—Ordinary type: median and angular gibbosity.

exists in about half of the cases, and paralysis only once in 5 or 6. The three may exist together, but this is very rare. Generally,

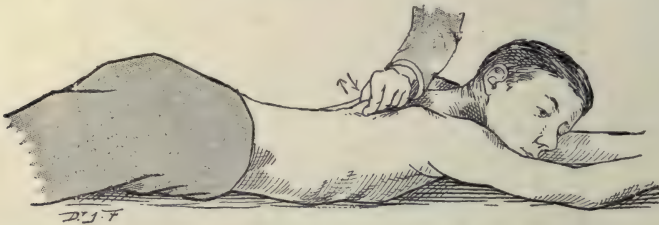


Fig. 209.—Searching for pain. Succussion; one seizes between the thumb and forefinger, the spinous process of the projecting vertebra, pressing upon it with short and quick lateral movements.

when an abscess is apparent there is no paralysis, and *vice versa*; on the other hand, gibbosity generally co-exists with abscess or with paralysis.

### Prognosis

This differs entirely according as the disease is treated or not.

#### A. If the disease is not well treated:

(a) The *gibbosity* will develop more and more, and the patient, if he survive, will remain hunch-backed.

(b) *Abscesses* are more frequent, more bulky; but especially do

they produce fistulæ. And fistulous Pott's disease nearly always ends with the death of the patient, sooner or later.

(c) *Paralysis* is alike more frequent, and is often fatal.

B. On the other hand, if **the Pott's disease is well treated:**

The *gibbosity* if recent will not only be arrested in its progress, but will be effaced.



Fig. 210.—Dorso-lumbar Pott's disease; typical attitude.

*Abscesses* will be less frequent; if they occur they will be cured, because they will not be opened or be allowed to open.

*Paralysis* will be very rare and, if it supervene, will be cured 19 times out of 20.



### Duration of the Disease

The duration depends especially upon the treatment carried out, and slightly upon the particular case, because the tuberculosis may vary in virulence. On an average, it is necessary to reckon from



Fig. 211.



Fig. 212.



Fig. 213.

1st stage. The patient flexes his knees instead of freely flexing the trunk. He uses his right arm to balance himself in order to preserve his equilibrium.

2nd stage. The left knee is in contact with the ground, the left hand seizes the object.

3rd stage. The patient raises himself by means of his right hand, which grasps a point on the thigh as a fulcrum.

three to four years, sometimes less, often more. In the case of **abscess well treated**, the duration of Pott's disease, instead of being prolonged on account of an abscess, is notably shortened.

### Diagnosis

**THE ORDINARY CASE.** *A patient is brought to consult you about a gibbosity. Three times out of four one has only to look at him to see that it is due to Pott's disease. Indeed, if the parents bring the*

child to you, it is because they are concerned at the appearance of a

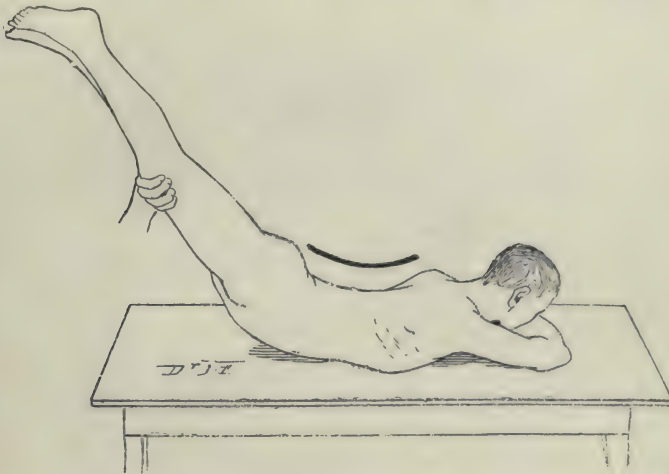


Fig. 214.—Examining the mobility; healthy subject. In hyper-extension, the entire spinal column participates in the movement and forms a regular curve.

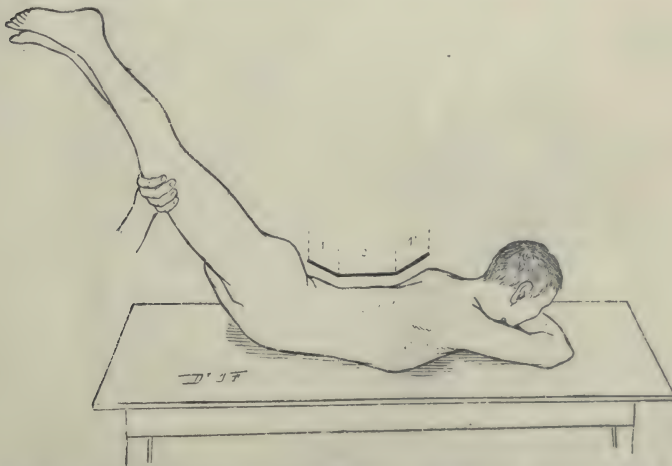


Fig. 215.—In the affected subject, the diseased segment (2) presents rigidity and the spinal column forms a broken line, 1, 2, 1.

prominence in the middle line of the back, and they want to know what it is.

How one recognises the gibbosity of Pott's disease (fig. 197 to 209). We have already said: 1st, it is **median** (over one



Fig. 216.—Lumbar Pott's disease; there is no gibbosity, strictly speaking, but the physiological lordosis has disappeared; that is sufficient. Here the diagnosis was confirmed a month later by the appearance of an abscess in the left iliac fossa.

or two spinous apophyses); 2nd, it is **angular**; 3rd, it is **painful** on **pressure**, and **especially** on lateral **succussion** (fig. 209).



Moreover, the **attitude** is "**stiff**" (fig. 205 and 219) and there is **rigidity of the spinal column**. The patient walks **all in a block**, without any flexibility (fig. 210). In order to **bend down** and pick up an object on the ground, he **does not bend the trunk** freely: he **flexes the legs** and kneels down rather than stoops (fig. 211, 212, 213). If one raises the two limbs and the pelvis of the subject **laid on his belly**, the back does not bend in the normal way; it resists like a board (fig. 214, 215).

Finally, the general condition is below par, and the ordinary antecedents of tuberculosis may be found.

**LESS FREQUENT CASE.** *No gibbosity has appeared.*—Once out of four times you are consulted only for functional troubles; **nothing is mentioned as being wrong with the back**. It is for you to **think of it** and examine the spine.

(a) When a child is brought to you carrying himself badly (fig. 210), is quickly fatigued, complains of a stitch in the side, or **girdle pains**, or **pains in the limbs**, diurnal or nocturnal, never neglect to completely examine



Fig. 217.—Rare type; pseudo-scoliotic form. An iliac abscess shortly confirmed the diagnosis already made of Pott's disease.



Fig. 218.—Another rare type: median gibbosity, but no angularity. The tuberculous round back.

the patient perfectly nude, and to carefully inspect the back and the lower limbs.

If you find a **gibbosity**, the diagnosis is easy.

Failing that, if you find **pain** on succussion, **stiffness** in

walking, difficulty in stooping, these will **suffice** to make a diagnosis of Pott's disease.

(b) Sometimes the patient is **brought to you only for an abscess—cold paravertebral**—(in the neck, the back, the thigh, or the internal iliac fossa). Think of Pott's disease and examine the back. Bilateral symmetrical abscess is an indication of Pott's



Fig. 219.—A rare type, of the same kind as in fig. 218 ; Pott's disease of the kyphotic form ; median curvature, but not angular.

disease 99 times out of 100 : but unilateral abscess should also make you think of it.

(c) More rarely, *it is for paralysis that you are consulted*. Think here, again, of possible Pott's disease, and look for the different signs which have been given you about that.

### Differential Diagnosis and Causes of Error

With what can it be confused ?

(a) *The gibbosity*.—If this is very slight, and situated at the seventh cervical vertebra, **do not forget the prominence normally made by the seventh vertebra**, called, for this reason, the



Fig. 220.—Cervical Pott's disease ; left torticollis and fistula on the right, in the supra-clavicular hollow. He came to Berck with a diagnosis of suppurating cervical adenitis, which had been opened. We recognised Pott's disease by pain on pressure over the third cervical vertebra, stiffness of the neck, and by a retro-pharyngeal abscess (see fig. 221), communicating with the fistula.

*prominens*. In the normal condition, there is no pain, no stiffness, etc.

It is the same with the **tenth dorsal**, which often presents a **slight (normal) prominence** of a few millimetres.

On the contrary, **the lumbar and cervical regions are normally concave**. One ought, then, when they appear flat (fig. 216), to



think at once of Pott's disease, and look for the other signs: pain, stiffness, etc.

**Scoliosis** sometimes presents a median knob, but this is as nothing compared to the two lateral curvatures in the opposite direction which are present below this median knob.

It will be well, however, to **reserve our diagnosis**, if at the

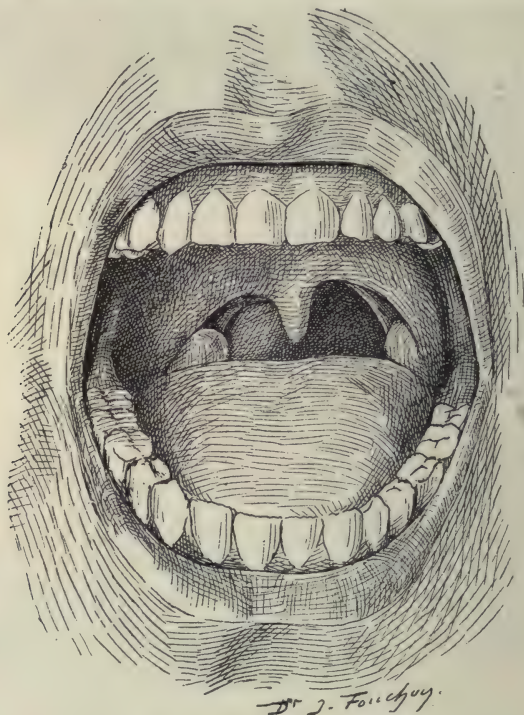


Fig. 221.—The child in fig. 220; abscess pushing up the right side of the pharynx. Uvula pushed to the left, right edge of soft palate pushed down.

same time that there is a lateral curve one finds a **marked pain over a spinal apophysis**; because one has seen Pott's disease assuming the scoliotic form (fig. 217).

**The round back** is a non-tuberculous deformity (see Chap. IX). Nevertheless, Pott's disease may sometimes present, instead of an acute gibbosity, a regular curve of several vertebræ (fig. 218, 219), **a round back**, which is then **painful and stiff**, with a poor general

condition. These characteristics ought to make one think of Pott's disease, or, at least, to make one reserve the diagnosis.<sup>1</sup>

But be reassured, because it is rarely that Pott's disease appears in the form of lateral deformity or of round back.

**Gibbosity following accident:** the diagnosis is made by the history of very grave injury, by the sudden appearance of the deformity, with general medullary symptoms, etc.<sup>2</sup>



Fig. 222.—Touch often allows one to distinguish an abscess by gravitation in the neck from an idiopathic or glandular abscess. If it is a pharyngeal abscess of vertebral origin a finger laid on the posterior border of the sternomastoid and exercising light palpation over the deep tissues will convey the impression of fluid to the index finger introduced into the pharynx, on the left. This effect would be absent in the case of glandular abscess (c) on the right.

(b) **Abscess.**—Causes of error in diagnosis.

If there is at the back of the pharynx a cold abscess, one always thinks of Pott's disease. One will examine and palpate the

<sup>1</sup> For the diagnosis of rachitic kyphosis, see p. 634.

<sup>2</sup> Syphilitic gibbosities are rare; they are rather of a mixed form, a "scrofulate de verole" (see Chap. XXI.).

The diagnosis from spondylitis deformans and other ankylosing arthritides of the spine, by the existence of a large curvature, of a generalised ankylosis of the spine, and frequently stiffness of the joints at the root of the limbs, etc.

corresponding spinal apophyses; one will look for antecedents; *torticollis* intermittent or chronic, radiating pains about the neck,

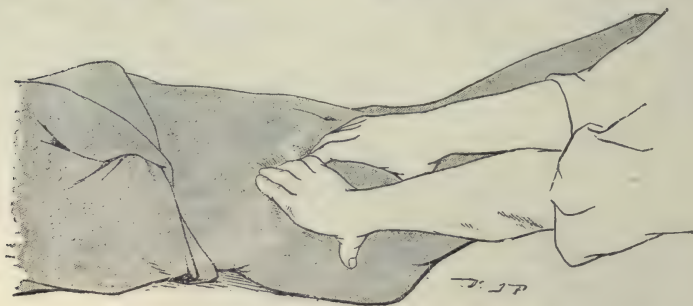


Fig. 223.—The method of palpating the internal iliac fossa in looking for an abscess: the pulps of the fingers are firmly pressed into the abdominal wall, pushing aside the intestinal mass.

the arms, etc., so that you should **not mistake a Pott's disease for a simple idiopathic retro-pharyngeal adenitis**. An abscess in the neck

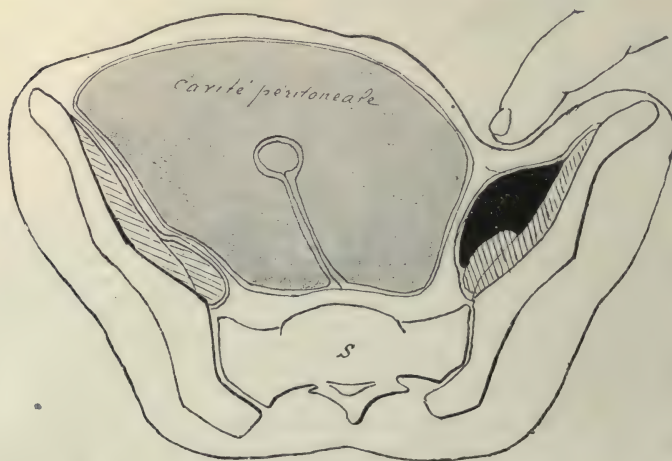


Fig. 224.—Palpation of the iliac fossa; the hand, in pushing aside the intestinal mass, comes in contact with the wall of the abscess.

**due to adenitis differs from an abscess** by gravitation by the same signs (fig. 220 to 222). When an abscess is situated in the



right iliac fossa (fig. 223 and 224) take care not to confuse this with a cold **appendix** abscess, an error which I have seen committed.

One will distinguish it also from a localised **tuberculous peritonitis**, from a simple **glandular abscess**, and especially from an incomplete **hernia**, an unfortunate mistake I have seen made (see Chap. XIX.).



Fig. 225.—A child showing the diagnosis of right hip disease. He had a right iliac abscess with dorso-lumbar Pott's disease at the beginning (without hip disease).

Here, again, the diagnosis will be made by examination of the back, which one should never neglect in such cases.

(c) **Paralysis of Pott's Disease.**

This may be confused sometimes with **myelitis**, **syphilitic** or

**alcoholic**, and sometimes even with **infantile paralysis**, or the **paralysis of cerebro-spinal meningitis**. You will avoid this confusion by examination of the back, analysis of the other signs,<sup>1</sup> and by the history, different in these diverse maladies.

### Diagnosis of Pott's Disease from some other Maladies

**1. From Hip Disease.**—When a child comes to you for functional troubles only, such as a defective attitude (fig. 225), or a halting gait, it is necessary to examine successively the back and the hip (even the knee), in order to discover if limitation of movements and pain on pressure over the bones, etc., etc., are to be found in the hip (hip disease), or in the spine (Pott's disease).<sup>2</sup>

**2. From Dorsal Rheumatism.**—If the rheumatism is very chronic, distrust it! **How many cases of Pott's disease have been dignified with the name of Rheumatism (or of Sciatica) until, sooner or later, a gibbosity or an abscess became conspicuous to the eyes of the practitioner or to the patient's friends.**

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## THE TREATMENT OF POTT'S DISEASE<sup>3</sup>

### 1. What ought to be done; 2. How it must be done

#### 1ST PART.—WHAT OUGHT TO BE DONE

*This depends upon the condition found.*—Five Cases: 1st, no gibbosity, no abscess, no paralysis; 2nd, gibbosity; 3rd, abscess; 4th, fistula; 5th, paralysis.

<sup>1</sup> In the paralysis of Pott's disease, the reflexes are exaggerated from the beginning (always, or nearly always). Later, spasms and contractions, trouble, of sensation, with the sphincters, trophic lesions (bed-sores), etc.

<sup>2</sup> Hip disease and Pott's disease may co-exist.

<sup>3</sup> We are only dealing here with local treatment, because we have nothing to teach practitioners on **general anti-tuberculous treatment indispensable for all these patients**, namely, good hygiene, over-feeding, medical treatment, and especially open-air treatment (such as our patients at Berea enjoy, **out of doors from morning until evening and in all weathers**).

## 1ST CASE.—POTT'S DISEASE WITHOUT GIBBOSITY

It may happen, in patients who have been very well looked after, that they come to you before the appearance of any gibbosity. This is not very often.

**A. Therapeutic Indications.**—To favour the cure of the tuberculous focus and to prevent a gibbosity occurring.

**B. The Treatment** comprises two things.<sup>1</sup>

**I. Rest in the recumbent position.**

**II. A Plaster apparatus.**

1. **REST.**—Place the patient at rest in the recumbent position, for one and a half or two years.

2. **THE PLASTER APPARATUS.**—You should apply this at the beginning, during the period of rest, and the patient should continue to wear a corset after getting on to his feet, for two or three years longer at a minimum, which makes, in all, from four to five years; in a word, he will not leave it off until the welding of the vertebræ is accomplished; in the same way, in a fracture, one keeps to the plaster until after the formation of a solid callus.

**Necessity of the Plaster Apparatus.**—No one seriously disputes the necessity of rest in the recumbent position during the whole period of activity of Pott's disease; but it is not so with regard to plaster apparatus.

Why not rest only? they say. Or a Bonnet's splint, or a "frame" with or without extension?

Why? Simply because all these other treatments are not to be depended upon and are insufficient. They do not give good results, especially with children.

Here is, *as to simple rest*, the opinion of Lannelongue: "One sees in Pott's disease gibbosity produced and aggravated in spite of horizontal decubitus. I could quote a respectable number of

<sup>1</sup> These are evidently applicable to all cases of Pott's disease during the period of activity of the disease.



clinical instances where gibbosity has continued to progress in spite of decubitus very strict and of long duration."

Passing on to the value of *splints*: "I have seen at Berck-sur-Mer," says another surgeon, "gibbosities beginning and augmenting in splints." And Lannelongue on the same topic says, "Oftentimes, when the child is taken out of the splint, he is deformed."

These quotations exempt me from bringing forward personal observations upon numerous patients I have seen, treated elsewhere in this way, in whom were produced gibbosities more or less bulky.

Moreover, that would astonish only those who have forgotten that **every case of Pott's disease is a fracture** (pathological) of the spine, already produced or very imminent, with a very marked tendency to the overlapping of the fragments.

**It is necessary to prevent the displacement of the two fragments.**

It is easy to understand that **rest alone is not sufficient for this. Success can only be obtained with certainty by the use of a large plaster**, which will support very exactly the two segments of the diseased spine.

Do not, then, hesitate to apply it immediately. Hesitation is so much the less permissible, seeing that **the treatment by plaster** is not only by far **the most efficacious**, but is, all things considered, **the most simple and most practicable for everybody**—parents, patients and doctors. The other treatments: splints, extension frames, special beds, plastered beds, etc., corsets made of duck, with rest on a board, *in spite of their apparent simplicity*, are, when one reckons up everything, much more complicated, more difficult to apply and look after, and much less comfortable for children.

## 2ND CASE.—POTT'S DISEASE WITH CURVATURE

(much more frequent)

*A. Indications for Local Treatment*

I. To arrest the increase of the gibbosity.

II. Correcting it if possible.

Is this correction logical? Yes.

It has been disputed. It has been vehemently denied.



Fig. 226.—Abel L., rue des Récollets, Valenciennes. There was a curvature on his arrival at Berck at the age of four years in 1898 (see fig. 227 and 228, showing the spinal column straightened).



Fig. 227.—The same in profile, 8 years after straightening. The slight prominence is produced by the scapulæ and not by the vertebral column (see fig. 226 and 228).





Fig. 228.—The same (see fig. 226 and 227); view of the back (in 1906), 8 years after straightening.

But we have to-day the clinical and radiographic proof of its correctness.<sup>1</sup> It will be

sufficient to cast your eyes on the figures following for you to be convinced (fig. 226 to 240).

They demonstrate that the dorsal gibbosity has been effaced at the same time that the spine has been welded in front.

If the thing has been possible for certain bulky gibbosities, with all the more reason will it be possible in small or medium gibbosities, the only ones you will have to treat in your practice (fig. 237. to 240).

But should and could a practitioner, not being a specialist, undertake the correction of a case of even slight gibbosity? Yes, on the same grounds that he should a correction of hip disease, or of white swelling of the knee; for a spine can be straightened as easily, if not more easily, than a hip or a knee, and without a shadow of danger.

Indeed, let us say it now, everything is reduced to the

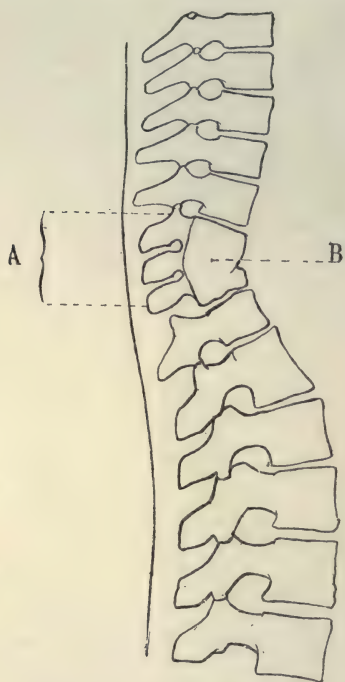


Fig. 229.—The patient in fig. 226 and 228. Outline of radiogram by M. Infroit, where one sees: 1st, that the vertebral column is continuous in front, B; 2nd, nevertheless the line of the back is straight; the gibbosity has disappeared, A.

<sup>1</sup> See, in *La Clinique* of July 20th, 1906; *Pourquoi l'on peut et l'on doit redresser les maux de Pott*, par F. Calot. Do not lose time; take care not to allow a gibbosity to increase. At this moment there is scarcely more than half a vertebra ravaged by tuberculosis. Later, after one or several years, when 3, 4 or 5 vertebral bodies have been destroyed, you will not be able to do much; the treatment will then have to be handed over to a specialist, who will not be able, at this stage, to obtain a perfect cure.

application of a large plaster in the upright position (supported and not suspended, then there is no traumatism) and to the making afterwards an opening in the plaster through which one can make **direct pressure upon the projecting vertebræ**, pressure by cotton wool, at once inoffensive and gentle, but at the same time very firm and efficacious.

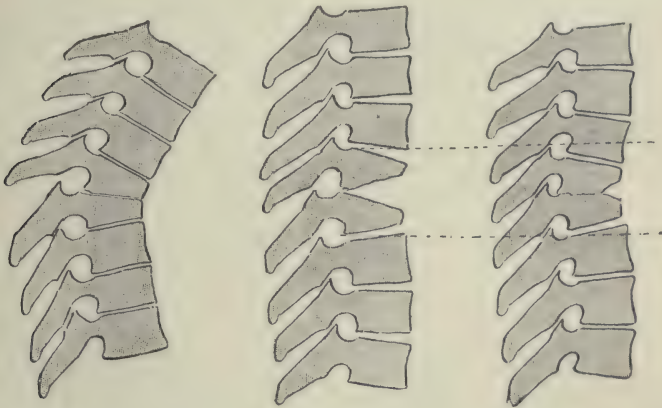


Fig. 230.

Fig. 231.

Fig. 232.

The mechanism of straightening a gibbosity in a case where, at the anterior part, the thickness of one vertebral body is lost. (From a radiograph.)

Fig. 230.—Before straightening.

Fig. 231.—Here are the modifications which the straightening will produce. The two affected vertebræ separate in front, no longer touch one another except by the posterior parts of their bodies; their articular apophyses come near each other; all the intervertebral discs are enlarged in front. But if one effects the straightening progressively over several months, the separation, produced without traumatism or destruction, will be filled in little by little.

Fig. 232.—Four years later straightening is accomplished. The new static conditions obtained have the following effect: 1st, the compressed posterior parts of the vertebral bodies become atrophied and sink; the two articular apophyses become more and more imbricated; 2nd, all the vertebral bodies are pushed forward where they are submitted to less compression; this allows them to develop more at this point (in front) than in their posterior parts.

Seeing that you are able to do this, you ought to do it, if only to prevent a greater evil—for **one is obliged to correct, at least a little, to make sure of arresting the development of the gibbosity already in existence.**



*B. The treatment to be carried out* in case 2 (the most frequent). We are going to describe it: a plaster, with a dorsal opening, permitting one to obtain not only surgical support, but also correction.

If the necessity of a plaster corset may perhaps, be



Fig. 233.—May O., London. Gibbosity dating four years.

debated in Pott's disease without gibbosity, **there need be no discussion when a gibbosity already exists.**

With all the other modes of treatment, one does not effect immediate pressure on the displaced vertebræ, and it is quite evident that the overriding, already present, of two spinal segments may increase, and that it will increase little or very

much. Simple extension by the feet and the head will not escape from this reproach any more than the other methods; **extension** is too **irregular**, too **difficult** to carry out, and



Fig. 234.—The child in the preceding figure, five years after commencement of treatment.

particularly too **indirect** to have any real practical value. I said too indirect; indeed, when a gibbosity of the tenth dorsal vertebra exists, for example, supported by sclerosed or

osteo-fibrous adhesions, an extension of several kilogrammes made on the feet or the head will have perhaps the effect of stretching the two extremities, but it will certainly not act in pulling into line the tenth dorsal vertebra, which will continue, on the contrary, to be displaced more and more, by an independent



Fig. 235.—Lucien B., Paris. Gibbosity existing eight years.

movement, due to local conditions against which this extension, too far away and too feeble, can do nothing.

On the contrary, with the large fenestrated plaster which allows of definite and direct pressure on the displaced vertebræ, not only are they unable to fall back further, but, under the



influence of this continuous pushing from behind forwards they return gradually into line.

Reason says it and experience demonstrates it. It is enough



Fig. 236.—The same, six years after commencement of treatment.

to look at the examples here given of corrections made by us in this way, to be convinced (fig. 227 to 240).

**Conclusion.**—In the same way that a fracture suggests plaster immediately, **Pott's disease** should henceforth **suggest** to you the **plaster corset**. It would even be easy to maintain that plaster is much more indispensable in the case of Pott's disease with gibbosity than in the case of ordinary traumatic fracture, where displacement, or even a tendency to displacement, does not always exist.



Fig. 237.—Martha G., Algiers. Gibbosity ten months before arriving at Berck.

### 3RD CASE.—POTT'S DISEASE WITH ABSCESS

**Axiom.**—Take care above everything not to open the abscess, nor to allow it to open ; for, if it is opened, it will scarcely ever heal ; a fistula will remain which will become infected sooner or later, and death will ensue.

Here there is no discussion needed as to the treatment which should be followed. Opinion is unanimous among well-informed surgeons.



Fig. 238.—The child in the preceding figure, three and a half years after commencement of treatment.

Even in the case of a **retro-pharyngeal abscess** in Pott's disease of the suboccipital region, the abscess **must not be opened**, but if grave and pressing functional symptoms should



arise **puncture** the collection by way of the neck, entering at the side. (See p. 338 for details of this technique.)

#### The Formula for the Treatment of Abscesses

Here it is, for the different varieties—

(a) **Leave the abscess alone**, if it is not easily accessible,

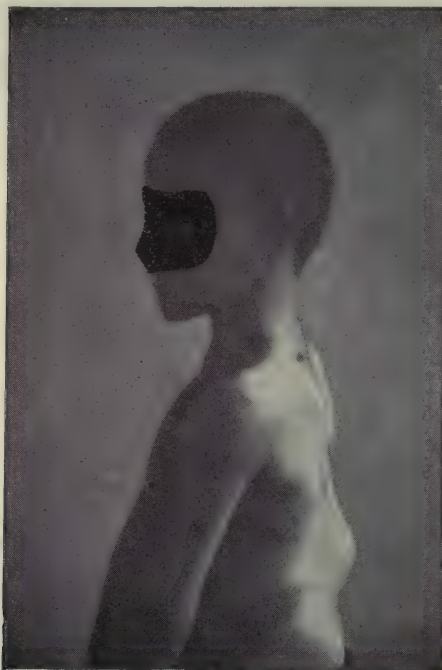


Fig. 239.—David Ter.-M., Tiflis. Gibbosity of two years' standing.

in which case the skin will not be in danger. This is *the most frequent variety*.

(b) **It is permissible, and even indicated, to empty it** if it is easily accessible, although the skin is not threatened.

(c) **One ought immediately to empty it** when the skin is in danger, in which case the abscess is easily accessible.

By emptying it, I mean *puncture* and *inject* it (see Chap. III).

## 4TH CASE.—POTT'S DISEASE WITH FISTULA

We have explained (Chap. III) the general treatment of tuberculous fistulæ.

You recollect that—

(a) *If the fistula is not infected* (there is neither fever nor albuminuria), one must inject into the sinus modifying injections



Fig. 240.—The same, three years after straightening.

(of creosote and iodoform, or of camphorated naphthol) either in the form of liquid or of paste.

(b) *If the fistula is infected*, on the contrary, injections are bad; the treatment, in that case, is summed up in these few words: make certain of the *drainage*, *rigorous antisepsis*, *rest*, *general treatment*, and . . . *patience*.

## 5TH CASE.—POTT'S DISEASE WITH PARALYSIS

(a) **The indication** is to release the cord from pressure and to modify, if possible, its circulation and its internal nutrition. (See fig. 202, p. 235.)

How are we to do this ?



Fig. 240a.—Germaine B., aged 7 years, of Santiago, Chili. Gibbosity of two and a half years standing. (This little girl was so restless and intractable that we were obliged to have recourse to chloroform in order to apply the first apparatus. The child was put to sleep and supported in the sitting position. See p. 347, "On the Use of Chloroform in Applying the Plaster." The child having been "made comfortable" by wearing the first apparatus, it was possible to apply the others without the help of chloroform.) See fig. 240b, the same child after treatment.



With or without operation ?

(b) The **treatment to be carried out** : one fulfils the indications by gently straightening the spine and by exerting afterwards a gentle and continuous pressure over the affected vertebræ, by



Fig. 240b.—The same three and a half years after straightening.

the only **orthopædic treatment** ; that is, by the application of a large plaster only, with a dorsal opening. Whilst surgical operations are nearly always useless, and even very often

harmful, they ought to be condemned without appeal in the treatment of paralysis, just as in that of abscess by gravitation.

Indeed, operations do twenty times more harm than good, not only because they show a considerable immediate mortality (nearly 40 per cent.), but because they leave a fistula, that is, a **complication much more formidable**, without contradiction, **than the paralysis** which one wishes to cure. For paralysis, remember, may be cured spontaneously, and especially it may be cured by orthopædic treatment alone, always, or nearly always.

Why not always? Because sometimes it is a question of tuberculous myelitis, against which our treatment is less definite and less certain.

Very often one observes a distinct improvement a few hours after the application of the apparatus. The two legs may perhaps have been absolutely motionless for more than six months, and behold, on the first evening, they move a little. Two or three days later, the heels are freely raised above the level of the bed. This return of functional activity in the paralysed part occurs almost invariably. Each week brings about a new improvement: in from 3 to 9 months the paralysis has disappeared, not only from the lower limbs, but also from the bladder and intestine.

## 2ND PART.—*THE TECHNIQUE*

On the whole, the treatment may be reduced to two things:—

A. The plaster corset.

B. Puncture and injection, when there is abscess.

I have laid down in the first part of this chapter what it is desirable should be done; I am going to describe in the second part how it ought to be done.

### A.—TECHNIQUE OF THE PLASTER APPARATUS

*How to make a good plaster corset, when no specialist is available.* which realises all the required conditions; that is, one which supports well and nevertheless does not incommode the patient.

A plaster corset is not more difficult to make than a plaster for the leg, which nearly all practitioners can make easily. The only difference between the two is that you have learned to make the latter, but not the plaster corset.

Well, I have undertaken to teach you, and I promise you will succeed in doing it, if you follow faithfully the technical indications I give you here.

***Make one or two preliminary rehearsals.***—What I ask of you is, as to the first corset you have to apply, to make for yourself (one or two days before) one or two general rehearsals on a “mannequin,” or on some healthy subject of the same age approximately as the patient. This will enable you to test the quality of your plaster, to train yourself, to educate your assistant, who may be simply your own domestic, if you cannot secure the aid of a trained nurse.

This rehearsal is always possible in practice, for, while in fractures the plaster must be applied immediately, you may, in Pott's disease, put off for one or two days the application of the corset. In the meantime, the patient should be kept at rest in the recumbent position.

**Choice of Model of Plaster Corset.**—There are three models: *the large plaster*, having the upper part in the form of a funnel or a tray enclosing the base of the skull (fig. 242); *the medium plaster, with an officer's collar* (fig. 241), and *the small plaster without a collar*.

They differ only in their upper parts, all of them stop below from 2 to 3 cm. above the great trochanter.

The choice of apparatus depends on the situation of the affection.

For Pott's disease below the 6th dorsal vertebra,



and for lumbar Pott's disease, we use a medium apparatus with a straight collar.

For Pott's disease of the cervical or upper dorsal regions, above the sixth dorsal vertebra, and for all Pott's diseases with paralysis, without distinction of situation,



Fig. 241.—The medium plaster.



Fig. 242.—The large plaster.

it is necessary to apply the large apparatus with the funnel-shaped upper part.

The small apparatus without a collar ought to be reserved as an apparatus for convalescence, for Pott's disease of the lower dorsal or lumbar regions.

### 1. The Medium Apparatus

We will describe first the construction of the medium plaster, which is, of the three, that most used ; we will point out as we proceed various peculiarities proper to the other two.

**Position of the Patient.**—"Stretch, but do not suspend."



Fig. 243.—*Stretch and do not suspend.*

Fig. 244.—*Partial suspension.*

In fig. 243, the cord has not been tightened. One sees in fig. 244, that in pulling on the head, one has rectified the attitude and even corrected (slightly) the gibbosity without the feet of the patient quitting the ground.

The apparatus should be made with the subject in the upright position ; one *supports* him only, without really suspending him.

Make, in a word, extension only, in such a way that the heels do not leave the ground (fig. 243, 244). This tension is :

first, absolutely harmless, as you may guess, even in enfeebled subjects; second, it is very well tolerated in all cases, for the



Fig. 245.—Pelvi-support made with a bicycle saddle on which is seated the paralysed patient, during the construction of the apparatus.

Fig. 246.—His thighs are a little flexed in order to free the ischia and render the support more stable, but not so much flexed as to hinder the exact application of the plaster in front. One steadies the patient by pressing on the knees.

10 or 12 minutes necessary for the construction of the apparatus, including the setting of the plaster.

If you adhere to this formula, you have gained everything



and lost nothing in **making the apparatus in the upright position** rather than in the horizontal position.<sup>1</sup>

The subject will thus be better adjusted without being

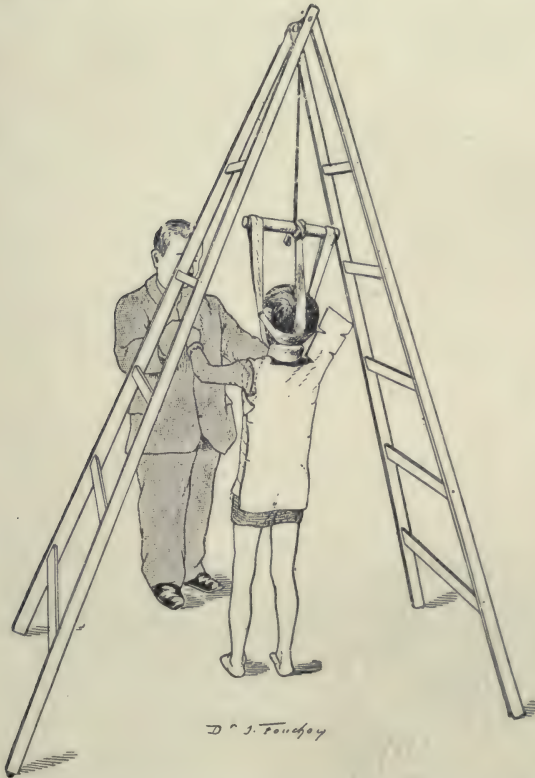


Fig. 247.—Extension apparatus improvised by means of a step ladder.

distressed, and you will have infinitely more facility for constructing your plaster accurately and precisely.

(a) **The Supporting Apparatus.**—The appliance for

<sup>1</sup> For *paralysed* subjects, you would construct the apparatus *in the sitting posture*, which gives sufficient traction (to free the spinal cord) and not too much (to prevent sudden injury to the tuberculous focus, and later on, an abrasion of the chin) (fig. 245 and 246).

supporting the patient should be, in default of a pulley, a simple cord fixed to a hook in the ceiling or in a doorway. The cord has at its extremity the centre of a horizontal bar of wood or metal, furnished at each end with a groove to retain the two terminal strands of the occipito-mental straps.

But, without pulley and without hook, you may anywhere



Fig. 248.—To make a girth, take a bandage of ordinary linen 20 cm. longer than the height of the patient; fold it in two and knot the two extremities together.

improvise a suspensory apparatus, by means of a step ladder (fig. 247), over the top of which you pass the cord sustaining the horizontal bar at a distance from the ground calculated from the height of the patient.

It is easy, with or without a pulley, to **regulate the height of the horizontal bar**, either by lengthening or

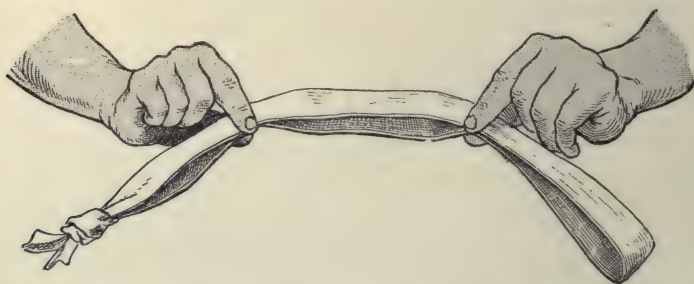


Fig. 249.—Divide this large loop into three by taking the bandage between the thumb and index finger of each hand at the two extremities of its middle third.

shortening the cord, or by approximating or separating the feet of the ladder.

(b) **The Occipito-mental Girth.**—The patient is held in the supporting apparatus by a girth or collar-piece (fig. 247).

With an ordinary linen bandage and two safety pins, one can improvise a girth which can with advantage take the place

of all the Sayre's collars, or of those sold by the instrument makers.

The figures following show the method of procedure. You take a bandage of a length equal to the height of the patient measured from the head to the feet (or, better still, 20 cm.

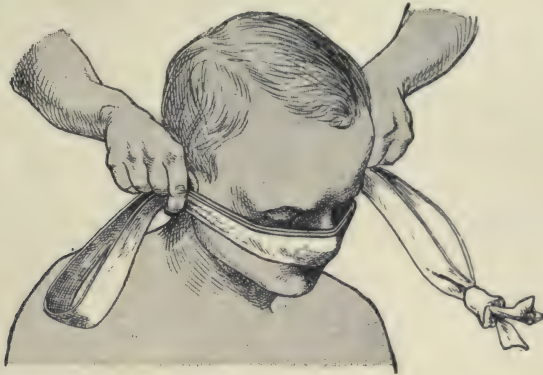


Fig. 250.—The median portion of the loop should be of such a length that, when applied (the two layers superposed) on the face of the patient level with the nose, the points held by the fingers and thumbs correspond with the auditory meatus.

longer), you fold this bandage equally, and knot the two free extremities together. You have thus a large loop (fig. 248). You then divide this single loop into three secondary loops, one median, to embrace the base of the head (fig. 249 and 250), and two lateral ones (which are folded upwards as soon



Fig. 251.—The fingers are replaced by two safety pins.

as the girth is in position) to hang on the two extremities of the transverse bar of the supporting apparatus.

The median loop ought to have a circumference equal to twice the distance which separates (in front) the two auditory meatus of the patient.



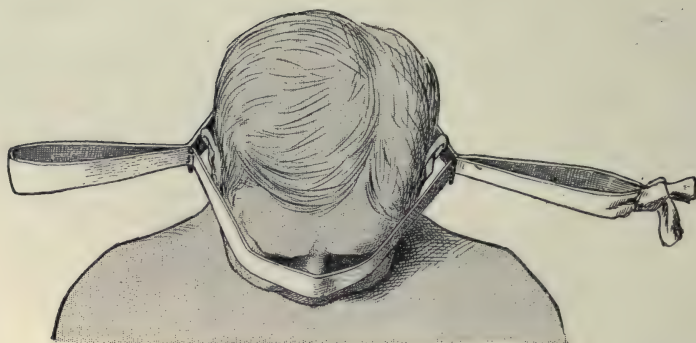


Fig. 252.—Placing the girth in position. The head engaged in the middle loop ought to pass through easily, but not too easily; only one centimetre of play must be allowed on each side (if it is more or less it drags on the pins and may pull them out).

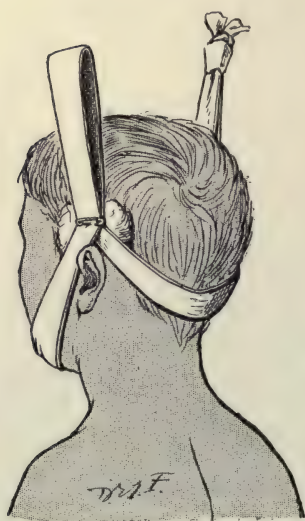


Fig. 253.—The two strands of the middle loop enclose the chin and the occiput. When the lateral loops are released the pin should be a centimetre above the upper border of the ear.

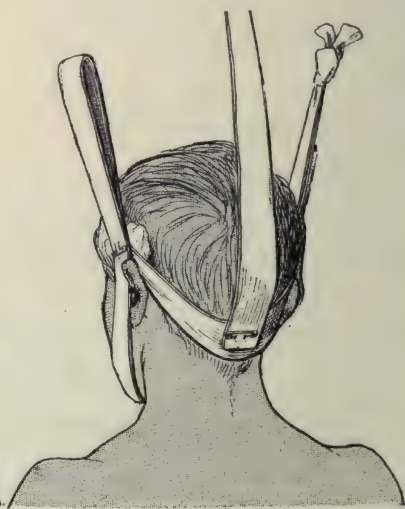


Fig. 254.—You fix with a pin one end of the strip to the centre of the posterior strands of the middle loop.

(One sees in these figures small squares of cotton wool with which you protect the skin against friction by the pins.

You measure the distance between one ear and the other simply with the middle portion of the bandage held thus (fig. 249 and 250): with two fingers on each side. The measure taken, you fix two pins transversely, in place of your fingers (fig. 251).

So much for the dimensions of the median loop, which is most important. On the other hand, the lateral loops are not of so much importance: it is sufficient to have them equal, for their inequality may produce an inclination of the head to one side or the other, which must be avoided. To *adjust* a girth you open horizontally the middle loop, introducing it from above downwards (fig. 252) to the root of the neck. You adapt the anterior strand to the chin and the posterior strand to the occiput, after which you release the lateral loops in order to pass them on to the extremities of the horizontal bar (laying them in the grooves if there are any). This being done, the middle loop will spread out like a fan, which will prevent its slipping when the patient presses upon it, and it will slip all the less the more he presses (provided that you have given it the measurements indicated above). But if the patient pulls on the girth, you see the chin carried to the same level as the occiput (fig. 256), that is to say, that the head *tilts backwards*.

Normally, the chin should correspond with the level of the lower part of the third cervical vertebra. In order to bring it back to this level (the normal) we take a supplementary strip of linen (one metre in length) of which one extremity is pinned transversely over the middle of the posterior layer of the girth (fig. 254), whilst the other free extremity will be pulled upwards and, as soon as we pull upwards, it will tilt the head forwards. We pull until the chin returns to the normal level

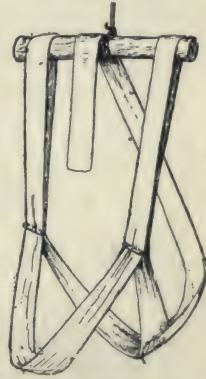


Fig. 255.—The girth finished and adapted; the parts are stitched together.

(fig. 257). As soon as this is done, you fix at this degree of tension the free extremity of the strip by turning it round and tying it to the centre of the horizontal bar (fig. 257).

I would advise you, so as not to distress the patient, to adapt and test the girth while he is still at rest on the table; you may even leave him there until the different parts of the corset are ready.



Fig. 256.



Fig. 257.

Comparison of the two figures shows the utility of the posterior strip.

Fig. 256.—The strip is missing: the two strands, anterior and posterior, being equal, the head is pulled backwards.

Fig. 257.—The posterior strip prevents the head being pulled backwards.

### Preparation of the Parts of the Corset

The apparatus is made with strips and plastered attelles applied over a jersey (see *General Directions*, Chap. I).

Procure: 1st. From **5 to 10 kilos** (so as to have "too much") of **white plaster** of Paris.



2nd. Some common **stiff gummed muslin, No. 8** ; have too much of that also, say, from 10 to 20 metres according to the age of the patient.

From this muslin, cut the *strips* and the *attelles*.



Fig. 258.—Method of cutting the attelles out of a piece of muslin.

(a) Make some **strips 5 m.** long, and from 12 to 15 cm. wide.

**Number of Strips.**—Two for a child from 3 to 5 years,

three for a child of from 6 to 11 years ; four for a child of 12 or 14 years ; five or six for an adult.



Fig. 259.—Posterior attelle torn in the middle to a third of its length (width equal to one-half the circumference of the trunk plus 2 to 3 cm.).

(b) Cut also **3 attelles** (fig. 258): two large ones for strengthening the back and front, and a small one for the neck.

*Their thickness* is three sheets of muslin for each (fig. 258). *The length and width* are the same as for the two large ones: length  $1\frac{1}{2}$  times that of the trunk; width,  $\frac{1}{2}$  the circumference of the trunk, plus 2 or 3 cm. (fig. 259).

The length of the small attelle is equal to one turn round the neck plus 3 or 4 cm., and its breadth equal to the length of the neck (fig. 261). One of the two large attelles is cut to a third of its length in two equal tails. Finally, the edges of the one and of the other are slightly incised at several points by a few cuts of the scissors, to facilitate their application around the trunk, and to prevent creases (fig. 267).

The strips and squares of muslin being cut to size, we pass on to the *preparation of the patient*.

#### Preparation of the Patient

The patient, **still laid down**, is invested with the jersey. Do not apply cotton wool,<sup>1</sup> because it is difficult to spread evenly. Rather use a jersey (fig. 260), or, better, two jerseys, one over the other and fitting well. If there remain any folds obliterate them by "pinching" in front.

The two edges (anterior and posterior) are joined together at the bottom, between the legs, by means of two safety pins. To complete the upper part of the jersey, prepare a neck-piece



Fig. 260.—Jersey, woollen neck-piece, and cotton-wool square applied over the thorax.

<sup>1</sup> Or, if you must use cotton wool, see that it lies uniformly and in as thin a layer as possible, 2 mm. at most.



of some soft material, circular and fitting well, which should be closed behind<sup>1</sup> (fig. 261).

Prepare also, for putting on the breast over the jersey, a square of cotton wool of 1 or 2 cm. in thickness, and the length and breadth of the thorax. This wool is intended to facilitate, by its elasticity, the expansion of the thoracic cage (fig. 260), and it will be possible to remove it afterwards, when the anterior opening in the apparatus has been made (see pp. 295 and 296).

The cotton-wool square and the neck-piece thus prepared will not be put in place until the patient is on his feet, in good position.

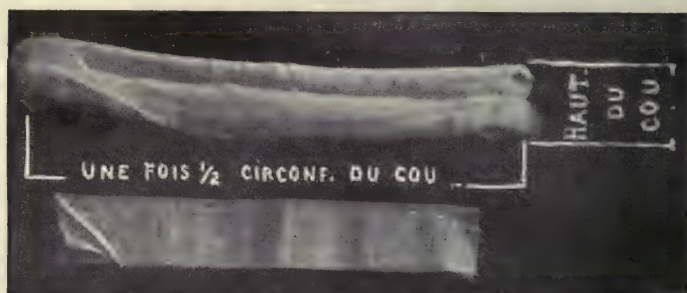


Fig. 261.—Neck-piece composed of a strip of cotton wool between two folds of soft muslin. Underneath, one sees the attelle for the neck.

The patient, dressed in the jersey, is afterwards furnished with the girth, the centre of the anterior strand of which corresponds with the point of the chin, and the posterior strand with the occiput, whilst one gently raises the two lateral loops (fig. 262 and 263). One protects the ears from the lateral pins by two small pieces of cotton wool.

<sup>1</sup> Failing a cloth neck-piece, you may use a circular cravat, made with a strip of cotton wool of a length and breadth equal to the height and circumference (or, better, one circumference and a half) of the neck, and  $\frac{1}{2}$  cm. in thickness, which one places between two folds of soft muslin of the same dimensions. This cravat is passed round the neck, the centre in front and the two extremities held over the nucha by an assistant, or by a stitch or a safety pin, until it has been fixed by the first turn of plaster bandage.

### Placing the Patient in Position

The patient is placed upright, beneath the suspension apparatus; the two loops of the girth are placed in the grooves of the horizontal bar, at about 10 cm. from the centre, at any rate, at an equal distance from the centre, so that there is no inclination of the head to one side. To lower the chin to the desired level, you then pull on the second strip, and fix it in

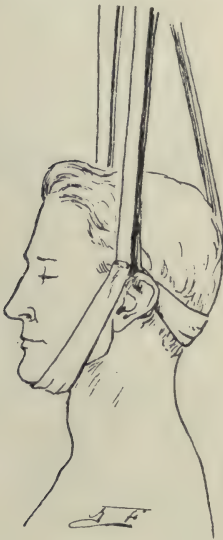


Fig. 262.

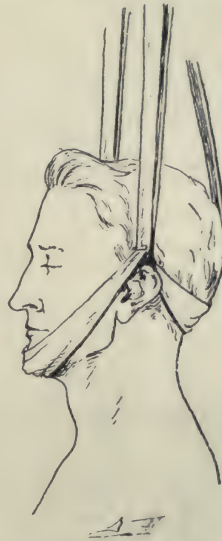


Fig. 263.

To the left of the reader, the bad application of the chin-piece which, placed too far back, slips back and impedes respiration. To the right, the good application of the piece; it embraces the chin after the fashion of a sling, the point of the chin corresponding with the centre of the strip.

this position by tying the strip round the middle of the bar (see fig. 257).

One inspects the height of the suspensory cord, altering, if need be, shortening it or lengthening it, until the patient is "extended" to the required degree, that is, **just up to the point where the heels leave the ground, and no more.**

You satisfy yourself that the patient is at his ease, and, even if I may say so, quite comfortable. His hands are held by some member of his family; the arms separated from the trunk at an angle of  $45^{\circ}$ ; this is only a fictitious support—a “moral” support. Another person keeps in position, **for a moment**, the prethoracic square and the woollen cravat—until the first turn of the bandage fixes them in their place.

Immediately afterwards you pass on to the construction of the apparatus.

### *Construction of the Apparatus*

#### **1st. Preparation of the Plaster Cream**

It has already been said in the *General Directions* (see p. 19) that for plaster corsets it is **much better** to use **plaster strips, prepared** a little (very little) **beforehand**, rather than bandages steeped at the time in the plaster cream.

In the second place, for a corset, the **cream**, which serves as “mortar” and for plastering the attelles, **ought to be thinner than that for small plasters** for the leg and arm (one takes **4 cups of water, instead of 3**, to 5 cups of plaster).

This thinner cream will set in about 15 minutes (not as before, in 10). As you require a few minutes to verify the posture and to model the apparatus before the plaster sets, you have then from 10 to 12 minutes to construct the plaster; 10 to 12 minutes are sufficient, but are necessary, when you are not experienced. Moreover, you will have ascertained all this in the rehearsal you have made. If you have noticed that it took you from 15 to 18 minutes to build a “trial” apparatus, you may add, for the real plaster, half a cupful of water to the quantity mentioned above, which retards the setting by 4 or 5 minutes more; and, on the other hand, if you have only taken 5 or 6 minutes over the trial plaster (personally we take 2 or 3 minutes for constructing a corset), or, if the setting



of your plaster is not complete under 20 minutes, for example, you add for the real apparatus half a cupful of plaster, which advances the setting by about 5 minutes.



Fig. 264.—Application of the first strip. Begin at the angle of the left scapula (1); then the strip is led over the right shoulder, passing diagonally over the thorax, crossing the left axilla (2); finally, it is conducted horizontally behind, from the left axilla to the right axilla (3).



Fig. 265.—The first bandage then passes diagonally over the anterior aspect of the thorax, from the right axilla to the left shoulder (4); it is afterwards conducted diagonally behind, from the left shoulder to the right axilla (5); finally, it passes in front, going horizontally from the right axilla to the left axilla.

The plastering of the attelles is done in the ordinary way (see p. 18 and fig. 9), by dipping them in a basin half full of cream. Your assistant should do this plastering, while you

apply the first strip (or you do it yourself before the application, if you have not an expert assistant). The three attelles are left in the basin, awaiting the moment for their application.

### 2nd. The Method of Application of the Strips

Remember the three fundamental recommendations: it is



Fig. 266.—Placing in position the posterior attelle.

necessary to **spread out the strip, to apply it exactly, but without pressure.**

What should be the course taken by the strips? Not complicated in any way (fig. 264 and 265). You cover the region of

the shoulders by some diagonal turns and figures of 8 over the region of the shoulders, always avoiding ridges being made, incising the edges, if need be, when they are too tight.

Afterwards you go by circular turns from the axilla downwards, as far as needed, **without reverses** (see pp. 24 and 25). With a few cuts with the scissors at the edges, these circular bandages, moist and delicate, are easily applied, even over a trunk which is not normal in shape.

Each turn of the strip ought to cover nearly a quarter of the preceding turn.

In this way is made the first **continuous covering** of the trunk. One bandage will suffice for a little child; it may take two or three for adolescents and adults.

### 3rd. Application of the Attelles

One then applies the attelles, having taken care to spread them out, after having squeezed them.

(a) **One commences with the posterior one**, or "chassule." The inferior edge is placed on a level with the tip of the coccyx, so that the back is covered by two-thirds of the attelle. The upper third, which passes upwards over the scapulæ, has been split into two tails of equal width, to go over the shoulders (fig. 266); one tail passes over each, in front of the corresponding shoulder, afterwards under the axilla,



Fig. 267.—After the application of the attelle, some incisions are made in its edges to facilitate its adaptation. The right tail is already flattened down on the shoulder, the left tail is still raised. The two tails must go round the shoulders in front and unite below the axilla at the lateral borders of the attelle (see fig. 269).



and returns to unite with the corresponding lateral border of the posterior part of the attelle. Some incisions, made here and there, into the edges of each tail (fig. 267) facilitate its



Fig. 268.—Placing in position the circular attelle of the neck and the anterior attelle, of which the inferior third is raised up; that which is represented here is too narrow; it ought to overlap the axillary line by one or two centimetres.



Fig. 269.—The attelles in place: one sees the extremity of the superior tail of the "chasuble" under the axilla, and the inferior third of the anterior attelle raised up over the abdomen; also the attelle for the neck over the woollen neck-piece.

application and its exact adaptation to the circumference of the shoulder.

(b) One takes afterwards **the anterior attelle** and applies it first by its superior border a finger's breadth above the clavicles; it covers the tails of the preceding attelle, then



Fig. 270.—Modelling the apparatus above the iliac crests.

descends over the chest and abdomen. The inferior third hangs below the pubes; one folds this apron over the middle third, even with the abdomen; the fold corresponds with the line of the trochanters; this will be the lower border of the plaster (fig. 268, 269).

(c) **The attelle for the neck** is applied like a **circular cravat** (fig. 268) over a cotton-wool casing. The upper edge of this piece stops at one centimetre below the upper edge of the woollen cravat (fig. 269), and the lower edge encroaches upon the upper parts of the two preceding attelles. It is sufficient to roll it without any pressure (nevertheless exactly), to avoid with certainty all constriction of the neck. In a word, you apply it as you do your collar; were it made of sheet-iron and placed directly on the skin, it would not, however, compress your larynx.

**The three attelles being placed in position**, which is very rapidly done (a minute for each if one is assisted by one or two persons), **you join them** by rolling over them a plastered strip in the way mentioned for the under one; that is, in figures of 8 and circular turns.

One strip over the attelles and one below (two in all) suffice to construct the apparatus for children of less than six years, but four or five strips (in all) are necessary, as we have said, for subjects of from twelve to fifteen years.

You may have to use six or even seven strips (without counting the attelles) for adolescents and adults rather big and stout, to give thickness and the required resistance to the plaster.

**Between the different layers** of the strips and **over the last**, one spreads, as has been mentioned in the *General Directions*, a **layer one or two millimetres** thick of plaster cream. It is the mortar which unites into one solid block the different planes of the apparatus.

#### 4th. Modelling the Plaster

The apparatus is finished. Nothing remains but to model it over the pelvis and around the shoulders (fig. 270 to 272).

1. *Over the pelvis*: you model by embracing with both hands, half-closed, the spines and iliac crests, pressing the plaster very firmly **above the superior border and inwards**



along the anterior border of the hip-bone with the pulp of the fingers (fig. 270) whilst the palms of the hands press below the iliac crests. The spines and the crests are thus **capped, encased**, by the apparatus, without any risk of sloughing (fig. 271).

2. Over the *contour of the shoulders*, where an assistant<sup>1</sup> applies the plaster with very light pressure (fig. 271).

One occupies, in effecting the modelling, the few minutes which precede the setting of the plaster, according to the calculation laid down before. It is then, at about the fifteenth minute, the plaster being set, that the patient can be removed from the supporting apparatus. To do this, open out the feet of the step-ladder, or slacken the cord; then draw the patient forward, to disengage the chin-piece of the girth.

Let the child stand upright for ten minutes more, so as not to risk, by laying him down too soon, the cracking of the apparatus; then, the plaster appearing to be solid, the patient is laid down—placing transversely under his neck a small roll of cotton



Fig. 271.—Modelling the shoulders and iliac crests, in a large plaster: the modelling is done in the same way as in a medium plaster. Another assistant models at the same time the sacrum and pubes (that assistant has not been shown here in order to leave the figure more distinct, but see the figure on the following page.

<sup>1</sup> A second assistant makes it fit exactly over the pubes and the sacrum (see fig. 272).

wool to form a pillow, or, more simply, leaving his head to overhang the end of the table, supporting it with the hand.

#### 5th. Trimming the Apparatus

A quarter of an hour or half an hour afterwards (with the patient lying down) you proceed to trim the apparatus (fig. 273),



Fig. 272.—Modelling the sacrum and pubes in a large or medium apparatus. The iliac crests are modelled at the same time (see preceding figure and its explanation).

which is done with a bistoury or a *pocket-knife* well sharpened.

The plaster is cut down to the jersey only.

**At the bottom**, below the iliac spines, cut out a slice, just enough to allow the patient to bend the thigh to a right

angle, if it is desired that he should walk about with the apparatus. Cut out less if he need to remain incumbent; for the legs will be thus somewhat restrained, and immobilisation will be more perfect.

The plaster is trimmed so as to end in a pointed extremity over the pubes, and in a similar way behind over the sacrum.

**On each side at the shoulders** cut away all that overlaps the scapulo-humeral articulation.

The **arm-holes** are freed for 2 cm. so as to allow of ease in the movements of the arms.

The **superior border of the collar** is pared for a few millimetres to make it even.

**A small provisional opening is made afterwards over the front of the chest**, through which can be drawn the cotton wool placed in front of the jersey. This facilitates the movements of the thorax, without lessening the solidity or the accuracy the apparatus.

#### Strengthening the Plaster

Suppose that the plaster is too weak, all over, or at some one point.

It may happen in spite of all the precautions taken in laying the patient down, that the plaster has cracked during the manœuvre; it may even crack or become crumpled spontaneously.

Here is the way you remedy this: You pull on the top and

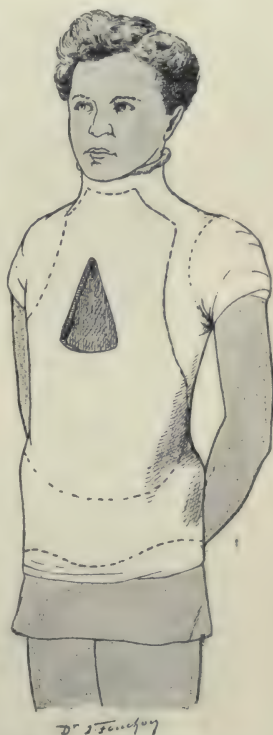


Fig. 273.—Apparatus with officer's collar and a provisional opening; the dotted lines show the limits of the large definite opening and the edge of the apparatus after trimming.



the bottom of the apparatus in order to return the patient (lying down or upright) to the position desired, and whilst two assistants maintain this position, it is fixed there, by the applica-



Fig. 274.—The medium apparatus trimmed. Permanent anterior opening.

tion of several squares of plastered muslin over the weak places, flattening them out with several turns of bandage. Hold the apparatus so until the setting of the new plastered pieces.

To succeed in making these repairs, it is well to commence by spreading over the part you wish to strengthen a layer of **rather liquid** paste (equal parts of water and plaster) and over this layer of paste you apply squares of plastered muslin, of a single thickness and one by one. This precaution is absolutely indispensable when it is desired to repair a plaster already dry. (For the details, refer to the General Directions on the Technique of Plaster Apparatus, Chap. I.)

### Polishing the Apparatus

Two days after it has been constructed, one polishes the



Fig. 275.—Dorsal opening for the compression of the affected vertebræ (in a large apparatus).

plaster, which is done after the method mentioned in the General Directions, pp. 73, 74 and 75.

### *The openings in the plaster*

24 or 48 hours after the polishing, you make the *permanent openings*.

In cutting the openings in the plaster, as in trimming, cut layer after layer, very gently, until you have the sensation of

no longer touching hard plaster, but the tissue of the jersey.

Be careful not to cut inadvertently *through* the jersey.

With a little practice you will easily succeed. But the safest way is to place over the jersey, **at the points where** you intend making the **openings** (over the gibbosity or at any other point), **a square of cotton wool** one-half cm. in thickness, before constructing the plaster. Thanks to this square, you will be able to make an opening without fear of wounding the child. The **double jersey** also gives a greater security.



Fig. 276.—Dorsal opening in a medium plaster.

1st. *Permanent anterior opening* (fig. 274).

*Its dimensions.*—Each lateral part of the plaster has a width equal to about a quarter the width of the breast, at the level of the shoulders. But the opening widens very much at the lower part, extending from one vertical axillary line to the other. The top piece is 3 or 4 cm. deep and the bottom one 8 or 10 cm.

2nd. *Dorsal opening.*

This is made at the same time as the anterior one.

In the case of a gibbosity unusually pointed, one does not wait for 2 or 3 days. Ten or fifteen hours after the plaster



is made, the dorsal opening is cut out, so as to be perfectly certain that all abrasion of the skin is avoided (fig. 275).



Fig. 277.—The flaps of the jersey are held by an assistant: you place in position the square of cotton wool, which you carefully spread out at the sides between the skin and the jersey by means of your fingers, or some flat instrument (a spatula).

**The dorsal opening is indispensable** in all apparatus for Pott's disease. I say indispensable. If you remove a piece

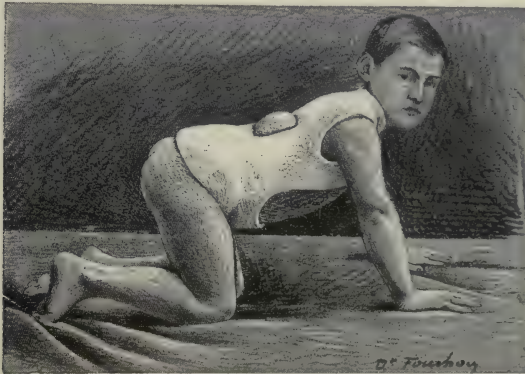


Fig. 278.—The dome of wool projecting through the dorsal opening.

from the dorsal aspect of any corset or apparatus, even if this corset has been applied during complete suspension of the

patient, and expose the bare skin, you will see (fig. 276) that

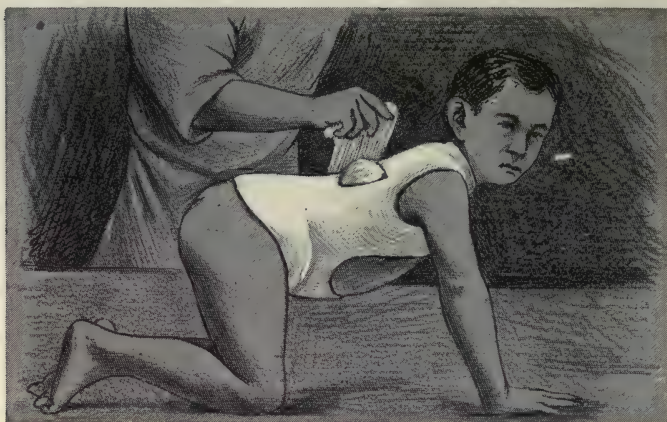


Fig. 279.—Compression of the dome by means of a strip of adhesive plaster.

the vertebræ do not touch the inner surface of the corset; there may even be a gap of from 4 to 5 cm., which proves

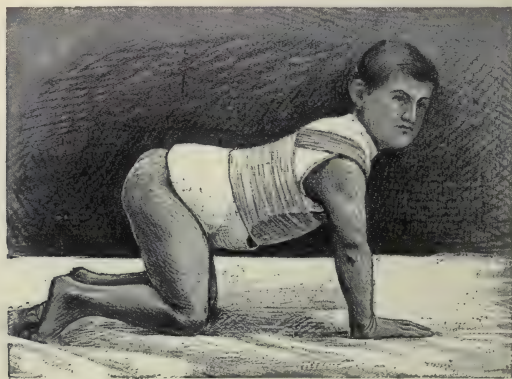


Fig. 280.—The compression is completed.

that they are not sufficiently supported. This simple examination explains too well how, in the ordinary corsets

without a dorsal opening, the gibbosities may not only persist, but become aggravated.

If you wish the affected vertebræ to be supported con-

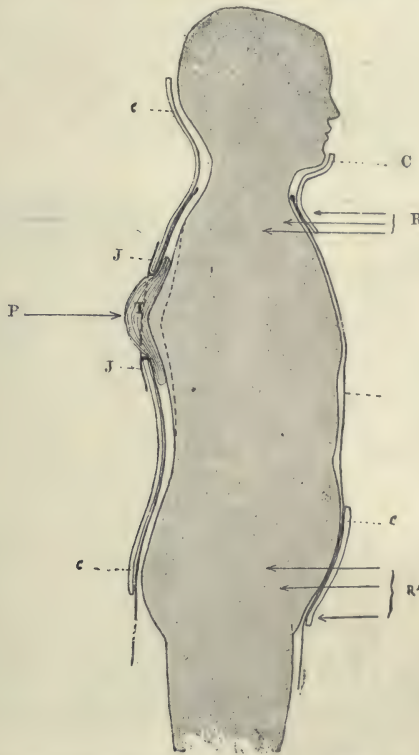


Fig. 281.—Schematic sketch of a large apparatus furnished with a compressive pad, before the application of the strapping: C. section of the plaster, interrupted in front by a large anterior opening (which reaches up to the hyoid bone, see fig. 241); J. Jersey turned aside at the edges of the dorsal opening; the squares of wool forming a pad over the gibbosity; P. direction of the pressure of the strapping which acts by pushing back the wool pad and the gibbosity to the position indicated by the dotted lines; R. Points of counter-pressure of the apparatus on a level with the scapular girdle; R'. Points of counter-pressure of the apparatus at the level of the pelvic girdle.

stantly, you see that it is necessary to place there, in considerable number, squares of cotton wool, in order to exert a continuous pressure upon the corresponding vertebral segments.



*Dimensions of the dorsal opening.*—It ought to extend from 3 to 4 cm. on each side of the affected vertebral segment (fig. 275).

The plastered piece is removed, as if it were punched out with a bistoury; then you divide diagonally the small square of exposed jersey, raise up the flaps, and proceed to the compression.



Fig. 282.—The bandage applied and partly obscuring the large anterior opening.

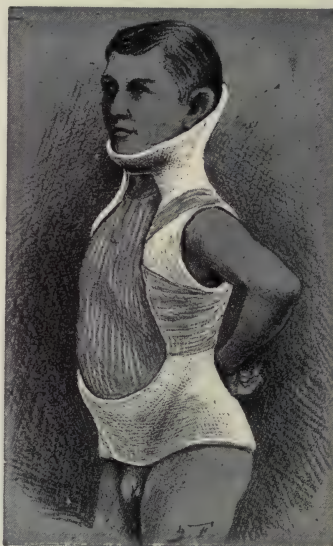


Fig. 283.—The anterior opening has been freed of the turns of bandage obscuring the opening partly.

### The Technique of Compression

**You commence** by anointing the skin with a layer of **vaseline** 1 or 2 millimetres in thickness.

Cut, next, **squares of wool** a little larger than the **opening** (fig. 276), and 1 cm. in thickness. Cut and introduce

them at once between the affected vertebræ and the internal wall of the pillars of the opening (fig. 277).

**Use 8 to 10 squares of cotton wool for the first compression.**

The wool makes a projecting dome through the opening (fig. 278). The projecting wool is forced into the opening until level with the plaster, and retained by one or two strips of sticking plaster, moistened, rolled round the apparatus, thus exercising a strong compression over the woollen dome (fig. 279). The dome diminishes by degrees until it is entirely effaced (fig. 280 and 281).

The sticking plaster very soon adheres firmly all round the apparatus, and a few hours later, you may cut out and remove the part of the bandage which covers the anterior opening: this restores to respiration its complete liberty (fig. 282 and 283).

The **number of cotton-wool squares** varies according to the case.

(a) *There is no gibbosity;*

You use 8 to 10 squares (to prevent the occurrence of a gibbosity).

(b) *There is a gibbosity;*

You can then go up to 15 or 18 squares of 1 cm. not at once, but at the third or fourth compression, when the space which is found between the vertebræ and the plaster has become more pronounced.

Eighteen squares seem enormous, but they adapt themselves in an incredible way, and we have never seen any harm arise from a compression carried to this extent in a gradual way.

The gibbosity is by this means, progressively pushed forwards, whilst the vertebræ above and below tend, on the other hand, to return towards the posterior wall of the apparatus, because of the immobilisation of the shoulders and the pelvis (fig. 281). The condition is comparable to that of a child leaning backwards against a vertical ladder, to which he is firmly attached by the

shoulders and pelvis, whilst the middle part of the back is pushed forwards with the hand.

All this is done slowly and methodically. If, however, this **very efficacious compression** is as energetic as you



Fig. 284.—Oblique occipito-mental cravat and circular turn of cotton wool, the one as it were the equator, the other the meridian, to complete the protection of the head.



Fig. 285.—The method of rolling the first plastered strip round the head at the equator and at the meridian.

could wish, it is, nevertheless, extremely gentle and very well tolerated. It produces no sloughing,<sup>1</sup> instead of which, with an apparatus unopened behind, sloughing is nearly constant although the pressure be inappreciable.

<sup>1</sup> Or almost never; see pp. 71 and 74, the means of detecting and treating sloughs.



## II. The Large Plastered Corset for Pott's Disease.

The large plaster encases the base of the skull.

The **posture** of the patient, the **supporting apparatus**, and the occipito-mental **girth**, are just the **same** as for the medium plaster.



Fig. 286.—Strengthening squares and occipito-mental attelle placed in position over the first strip for the sub-clavicular portion of the large apparatus.



Fig. 287.—These two pads are fixed round the head with a plastered strip.

Here are the differences between the two apparatus.

**The Lining.**—As before, the jersey and woollen pad over the chest. In place of the circular cravat, you see here, to complete the jersey, an **oblique woollen cravat**, embracing the chin and the occiput, **following** consequently the

**occipito-mental circumference** (fig. 284). An assistant holds the two extremities of the cravat over the middle line behind, until the first turn of bandage has been applied. You complete the covering of the base of the skull by two turns of wool one centimetre in thickness, of which one is carried perpendicularly to the cravat, as an equator, from the

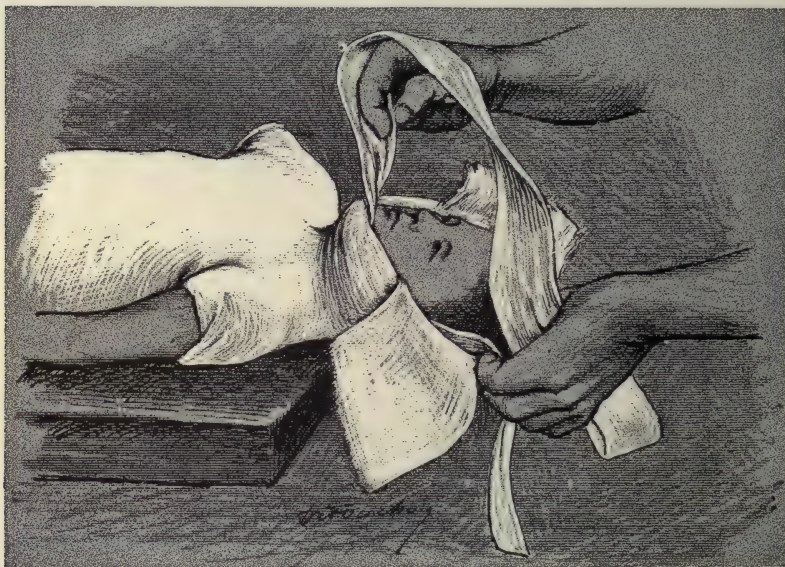


Fig. 288.—The upper end of the apparatus has been cut over the forehead and the two pieces turned over at the sides; one has removed the lateral pins of the girth, which one can then cautiously pull away. But if you cut the two tails on one side, you have only to draw them towards you from the other side; this second proceeding is much easier.

forehead to the nucha, the other circularly round the neck and the nucha.

**Preparation of the Attelles.**—The two large pieces for the trunk are the same; but, instead of the circular cravat, we prepare two square pieces, of from 15 to 25 centimetres according to the size of the subject (having the usual three thicknesses); these will be placed, one in front, the other behind,

to make the armature of the cranio-cervical portion of the apparatus (fig. 286).

**The Application of the Bandages.**—The first plastered strip is rolled round the head in **meridians** and **equators**, commencing rather by the meridians going from the vertex downwards to the jaw (fig. 285). You repass three times, then you cut the strip. Then you make three or four turns at the equator, from the forehead to the nucha. Add two or three circular turns, sufficiently loosely round the neck.



Fig. 289.—When the child is recumbent, place a bolster under his neck so that the back of the head does not rest on the bed.

Afterwards, you roll one or two bandages over the trunk, as for the medium plaster (see above).

**Application of the Attelles.**—The two attelles for the trunk are placed as in the preceding apparatus: the **two** supplementary square **attelles** are placed **the one before, from the chin to the clavicles, the other behind, from the vertex to the scapulæ**, encroaching, consequently, more or less amply upon the large attelles of the trunk (fig. 286).

Then you keep in position the two attelles for the head by some turns of bandages in meridians and equators (fig. 287)



as before, and the attelles of the trunk by a bandage rolled in figures of 8 and in circles; lastly, you unite the head and the trunk by a few intermediary circular turns.

You use, in the construction of a large plaster, one or two bandages more than for the preceding—according as you are dealing with a child or an adult.

After that you pass on to the modelling, which is done, over the shoulders and the pelvis, in the same way as in the first apparatus (fig. 271, 272).

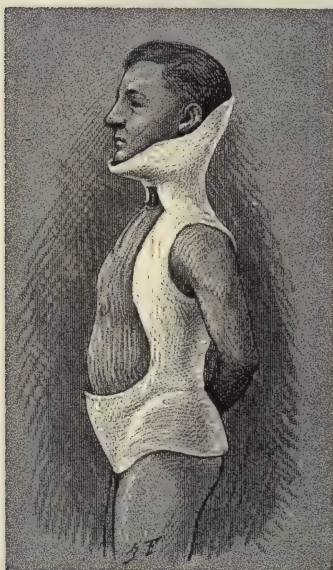


Fig. 290.—The large apparatus finished, with its opening reaching up to the hyoid bone.

It will not always be necessary to model the plaster with the hands over the chin and occiput; it models itself sufficiently if each turn of bandage in meridian and equator has been well applied (fig. 287); nevertheless, it is much better to model the jaw by passing the hand *horizontally* under the chin, in order that the plaster may make there a *plateau* rather than a funnel. You then wait until the plaster sets.

Afterwards you take off the tension by removing the loops of the girth from the bar. At the end of ten minutes, lay the child down, placing the head a little beyond the end of the table, so as not to break the apparatus.

**Trimming.**—Take away (with a sharp knife), proceeding slowly, all that part of the plaster which is above the occipito-mental circumference. This allows of the withdrawal of the girth; to do this, take away the two subauricular pins and pull out carefully the chin portion first, then the other; or, better, cut with the scissors, on one side only, below the

ears, the two tails, anterior and posterior, of the girth, and pull it towards you from the other side (fig. 288). It is much better to remove the girth than to leave it in position.

At the lower end, the large plaster is trimmed in the same way as the medium. A provisional opening is made afterwards (fig. 289) through which you withdraw the wool, as in the medium corset.

Three days afterwards, make a permanent opening, commencing at the junction of the neck and the jaw ; the larynx being free in front will not then suffer by compression, which you may have to exert over the affected cervical vertebræ



Fig. 291.—Extension of the spine in the horizontal position. An assistant models the apparatus about the pelvis. Two others make extension and counter-extension at the head and the feet, of from 10 to 15 kilogrammes.

(fig. 279). Dorsal compression is effected in the same way as in the medium apparatus.

#### The Construction of a Plaster in Paralysed Subjects

I have said that, not only Pott's disease of the cervical region, but also all the cases of **Pott's disease with paralysis**, are treated by the large plaster. Thanks to its funnel or plateau the extension of the spine necessary for the cure of the paralysis can be better and more exactly preserved than with the medium plaster.

The patient places himself in the degree of extension desired (see fig. 246, p. 272), for being unable to support himself on his feet (on account of his paralysis), and only and very imperfectly on the seat, he is somewhat suspended by the girth. If (the plaster being rather slow in drying) **the extension becomes too painful** towards the end of the sitting, you relieve him by discontinuing the vertical position.

You remove him (still attached to the bar) and **lay him down**. Then draw on the head, by means of the bar, with both hands, with what force you wish (10 to 15 kilogrammes generally), whilst an assistant holds him by the feet (fig. 291). The apparatus is modelled over the pelvis as in hip disease (see p. 426). Then **wait** in this position for the plaster **to set**.

### III. The Small Apparatus

The small apparatus is made in the same manner as the medium, but without the cravat and the neck-piece. It is an apparatus for convalescence in Pott's disease of the lower vertebræ. But in truth, we use it very little even in convalescence. Generally, we make a medium plaster with a collar-piece.<sup>1</sup>

#### Attention required after the Application of a Plaster

We have spoken of the trimming of the apparatus, of the openings, and of dorsal compression.

Sometimes patients (especially adults) are a little distressed for the first two days. You may calm<sup>2</sup> them by the mere

<sup>1</sup> Some remarks on the plaster corset.

(a) In cases of *abscess* or of *fistula*, make an opening in the plaster.

(b) *Sloughing* (strictly speaking, possible) : see p. 347, the method of recognising and curing it.

(c) Is *the age of the patient* with Pott's disease a contra-indication in the use of plaster ? No, one may plaster infants of one year (taking care to prevent soiling) just as one does aged people of more than 50 years.

(d) One may use *chloroform* (exceptionally) when constructing the plaster (see p. 347).

(e) *Multiple fistulæ* or *very intolerant* and *eczematous* skins necessitate daily attention ; in such cases, one may convert the immovable corset into a movable one (see p. 345).

<sup>2</sup> If the discomfort is too great, you may relieve it by dividing the corset



administration of anodynes, for to this discomfort will soon succeed perfect comfort.

You will leave the patient afterwards to the care of the parents; the doctor has no need to see him again more than **once a month** to **attend to the dorsal compression**, which is increased on each occasion by about a quarter of its amount.

#### **Removal of the Plaster towards the Fourth Month**

**To Remove the Apparatus.**—Place the child in an ordinary bath for a quarter of an hour. The plaster softens, and can be cut in a minute or two, with any kind of knife.

**The Toilet of the Skin.**—One makes it with ether or with eau-de-cologne, if the skin is neither soiled nor scaly. In the ordinary case, one rubs gently with vaseline for a few minutes, which has the effect of softening the epidermic scales; after which one dries the skin with a piece of fine linen, very gently, and passes over it a little alcohol or eau-de-cologne. One cleanses the front, then the back, turning the patient over.

**Search for Abscess.**—**You look**, by examining the back and the iliac fossæ, or, as the case may be, the neck and the pharynx, **for any trace of abscess in formation.**

### **THE CONTINUATION OF THE TREATMENT IN POTT'S DISEASE AND ITS DURATION**

#### **Placing the Patient on his Feet**

If no abscess supervene, everything is reduced to making a new plaster every 4 or 5 months.

**After two years' rest in the recumbent position**, the patient is **placed on his feet**, provided that he is **not suffering** any pain, either **spontaneously** or **from pressure on the back**, and that **his general condition is so good** as to allow you to think that the **vertebral focus is extinct** (or almost so).

in front in the median line so as to separate the edges by 1, 2 or 3 cm., but bring them together again and rejoin them two or three days later, when the patient has become accustomed to the apparatus.

## CONVALESCENCE

## The Apparatus

Then the patient is allowed to get up, wearing the same plaster apparatus.

—Hospital cases keep the plaster on for 2 or 3 years longer as a minimum from this time.

It must be removed only when, for the last 2 or 3 years, at least, pressure over the vertebræ no longer elicits the least tenderness, and the line of the back has not varied one millimetre, provided that the general condition of the



Fig. 293.—Large celluloid apparatus for Pott's disease, cervical or cervico-dorsal.

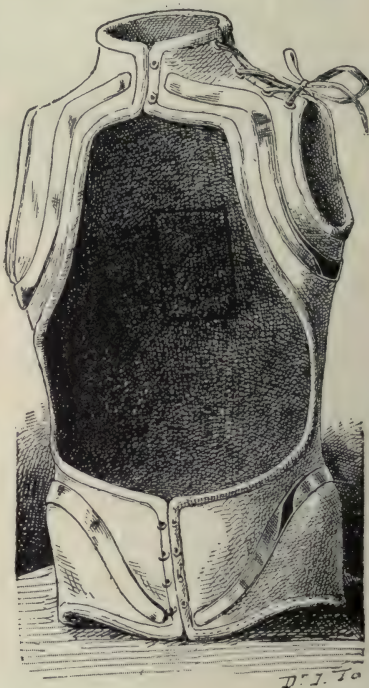


Fig. 292.—Medium celluloid apparatus. One sees the anterior part of the dorsal shutter.

patient is perfect. Under these conditions the *welding* of the *spine* may be supposed to be *complete* and *definite*. This can be ascertained by a radiogram of the profile whenever that is possible.

*In the case of children of the better class, it is better, when putting them on their feet, to replace the plaster by removable corsets, which allow of a thorough toilet, are lighter than the plaster, and furnished, like it, with a dorsal opening and a shutter, which allow of continuance of the support and of the compression of the affected vertebræ (fig. 292 and 293).*



Fig. 294.—Celluloid apparatus with large collar ; view of posterior aspect.

#### “Orthopædic” Corsets

The best from all points of view, are the corsets of celluloid (see fig. 292 to 294).

It is better, as I have said, to leave the rather difficult construction of these apparatus to special workers, and so, all that is left to you to do is to make a mould and fit the apparatus





Fig. 295a.—Medium celluloid corset.

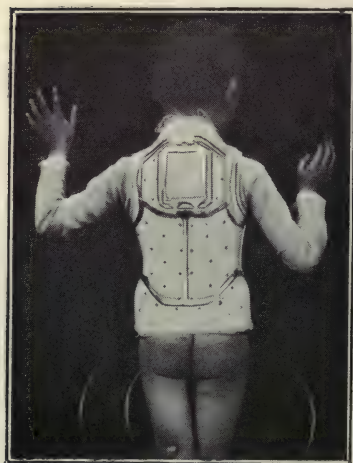


Fig. 295b.—The same. Dorsal window and shutter.

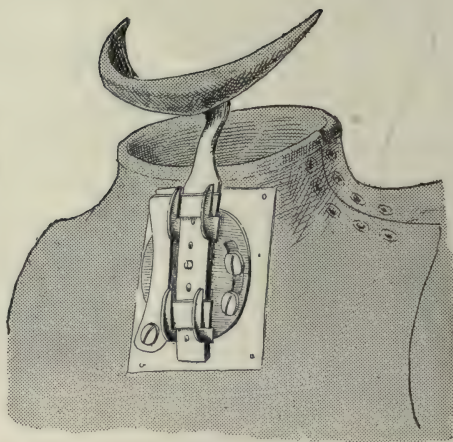


Fig. 295.—An arrangement for fixing the chin-piece of the minerva.



Fig. 296.—The patient is dressed in a jersey—two laths underneath the jersey.

on. This, each of you will be able to do quite easily after having read that which follows.



Fig. 297.—Placing in position the zinc laths which will serve as a protection when cutting the plaster.

*Method of taking a mould of the trunk.*—The patient dressed in a jersey with laths of zinc in position (fig. 296), is supported

by means of the girth; but be careful here to guard against "stretching" the patient until his heels lose touch with the floor; the tension should be much less, say almost nil, if you wish to make an apparatus in celluloid fitting very precisely.

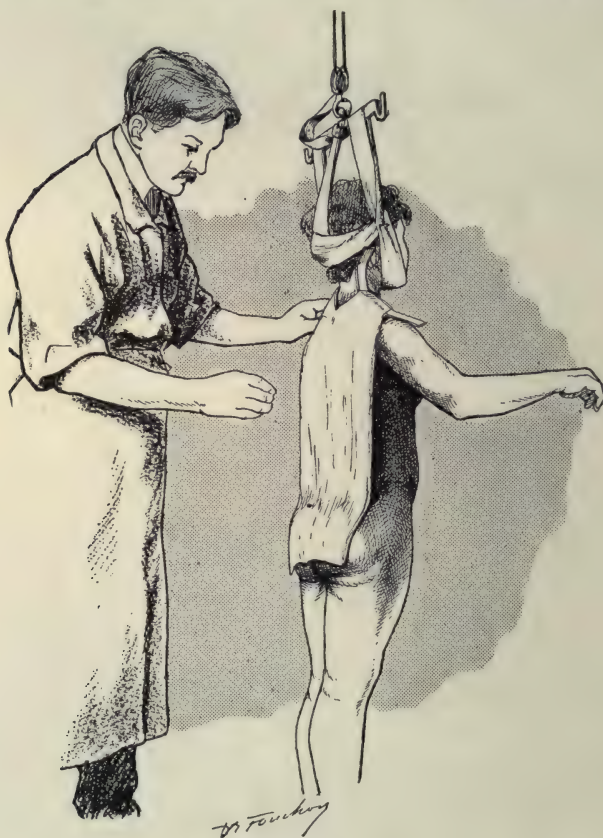


Fig. 298.—Application of the posterior attelle.

Instead of commencing the moulding by means of strips, as was done for the ordinary plastered corset, begin by applying the attelles. The dorsal attelle is placed in position first (fig. 298); in order that its edges adapt themselves better over



the sides of the trunk, make, if need be, several notches in it. The anterior attelle and the cravat are applied in the same way as is done in the construction of the ordinary plaster



Fig. 299.—The two attelles are in position ; flatten them out carefully over the skin.

apparatus. Roll one or two strips over the attelles, and between each layer spread a coating of plaster cream (fig. 300).

This will strengthen your mould. This done, verify and rectify, if necessary, the posture of the patient. You must, lastly, whilst the drying is proceeding, model the contours of



Fig. 300.—The attelles are held in position by a plastered strip.

the pelvis, and to do that, your hand must embrace very exactly the iliac crests, as has been described in the construction of the plaster corset.

When the apparatus is dry, that is to say, at the end of from 5 to 10 minutes, you cut it with a knife, following the course of the zinc laths. After it is cut it is easy to withdraw the



Fig. 301.—You divide the mould upon the zinc strips with a knife or a shoemaker's tool.

laths and to open the apparatus sufficiently to allow of its being removed (fig. 302 and 303).

When the mould is completed, you carefully bring together



the halves of the section and keep them in apposition either by enclosing the whole apparatus with several turns of soft

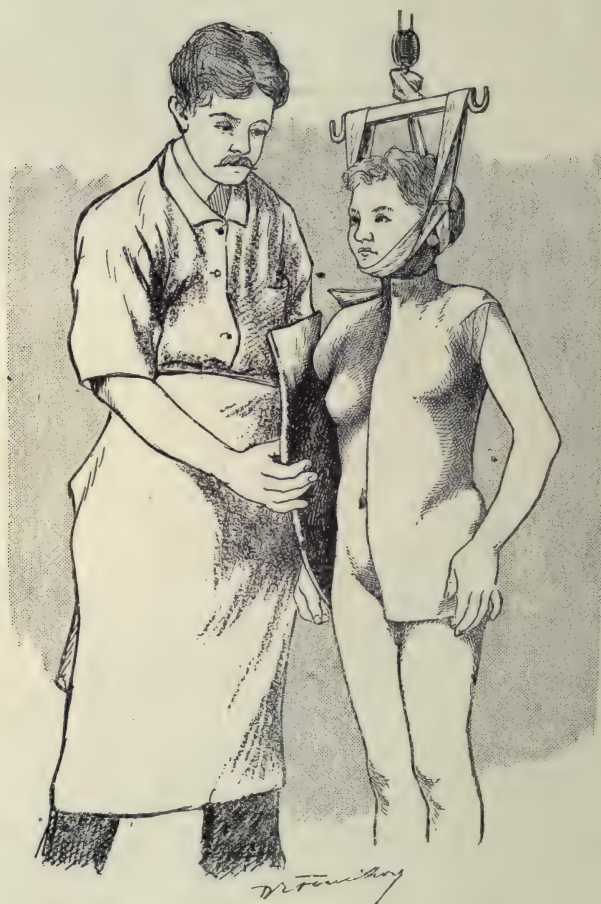


Fig. 302.—The laths have been removed ; you commence to disengage the mould from the right side of the patient.

muslin bandage (fig. 304), or by applying a narrow plastered strip over the slit, covering the two edges.

In this case, it is necessary to keep the edges in contact

until the plastered strip is dry. By this method the form of the trunk will be reproduced very exactly.

For greater security, you might—as we have already in-



Fig. 303.—The mould is taken off as you would take off a waistcoat.

dicated—pack the interior of the mould with paper or with wood shavings. The mould will take 24 hours to dry completely; during that time, you will hang it up, or at least you

will support it upright, for should it rest on one of its faces, it will run the risk of flattening and becoming out of shape.

*Moulding a celluloid with a large collar.*—You proceed in the same way when it is necessary to mould the base of the skull (for Pott's disease in the cervical region); the only difference is that you complete the top part of the jersey by 2 or 3 turns of soft muslin bandage, going from the chin to the vertex and from the occiput to the forehead, so as to avoid the application of plaster on the hair; let the zinc strips rise higher,



Fig. 304.—The edges of the mould are brought together by means of a bandage of soft muslin.

the anterior up to the point of the chin, the lateral to above the mastoid region (fig. 305 and 306). While the apparatus is drying, you model the chin with one hand, the occiput with the other.

*Method of fitting a celluloid corset.*—The orthopædic apparatus maker brings you the corset, divided through the median line and over the two shoulders, so that you may try it on (fig. 307, 308 and 309). We have mentioned, in the General Directions (see p. 97), the utility of this trial.



Introduce the patient sideways into the corset, so as not to need to open the apparatus too much (fig. 307).

The corset is fastened, and the sides are approximated by means of three leather straps encircling the trunk—one below the axillæ, the other at the waist, and the last at the level of the pelvis—whilst an assistant supports the apparatus above



Fig. 305.



Fig. 306.

Fig. 305 and 306.—The method of procedure for moulding the cervical part, or the minerva.

the shoulders. The straps are tightened so as to ensure the perfect application of the apparatus to the body ; if the apparatus is too large, you let its edges overlap, and you mark with chalk, on the celluloid itself, the corrections to be carried out. Note, also, the height to be given to the collar, the exact slope to be given to the shoulders, the openings required, either in front or behind.

So that the patient may be able to rest in a sitting posture, you mark the point where the apparatus should stop behind. In the same way, to allow of flexion of the thighs, you note the depth of the margin in front to be trimmed, so that flexion of the thighs may have an amplitude of  $80^\circ$  at least.

To *adapt a minerva*, mark out the occipito-mental line, indicating where the hollows are to be for the ears, and verify the curve of the nucha and the neck.



Fig. 307.—Trial of a celluloid corset.  
First stage of putting on the corset.



Fig. 308.—Second stage of putting  
on the corset for trial.

#### Before completing the Orthopædic Treatment

#### ONE WORD MORE ON THE CORRECTION OF GIBBOSITIES

**The Correction of the Gibbosity, that must be our Aim.**—Indeed, according as we overcome the gibbosity or not, Pott's disease will cease to exist, or will remain the terrible malady that we know it to be.

(a) **Gibbosities Small and Medium**

What you must know is how to correct gibbosities at the stage they are in when presented to you for the first time. Even in the working class, children will be **brought to you shortly after** the gibbosity has become **apparent** (and it is **very evident to everybody** when there is a **destruction equal to half or two-thirds of a vertebra**).

Seeing that, at this moment, you can still hope for



Fig. 309.—Trial of the celluloid (continued). Tracing with black chalk the crossing points.

the best by harmless and easy methods, we say that the **problem of the treatment of Pott's disease is resolved** from the practical point of view, in the same way as it is resolved for congenital dislocation of the hip, since, in children 2, 3 or 4 years of age, we are able to cure it, although we may no longer be able to do so when the patient has passed that age.

We have seen that there are two methods of treating gibbosities : **extension and direct pressure ; I recommend especially the latter**, because **extension is much more**



traumatising and **more difficult** to carry out. It is also **less efficient** and less certain, it being impossible to keep it up thoroughly by means of the apparatus without injuring the patient at the chin. On the other hand, *direct pressure* is gentle, well tolerated, easy to carry out and to keep up, and also very effective. Rely then on **direct pressure only, making no other extension but that which can be made without the heels leaving the ground.** In the second place, you have seen that the **correction** is made in 10 or 15



Fig. 310.—Celluloid corset.  
Without collar : front view.



Fig. 311.—The same seen from behind ;  
the dorsal opening closed.

**sittings, and not at once.** Correction by stages is gentler, quite harmless and just as effective. No time is wasted, seeing that the correction once obtained has, in both cases, to be maintained until the tuberculosis is cured and ankylosis produced, which requires several years. Therefore, nothing is to be gained by straightening at one sitting.

We have said that the compression must be renewed every month, until the gibbosity is effaced and the Pott's disease cured.

**Duration of Treatment of a Gibbosity**

A small or medium gibbosity in Pott's disease in progress



Fig. 312.—The method of making dorsal compression with a celluloid apparatus. The window open for the introduction of cotton-wool squares.



Fig. 313.—The cotton-wool squares, larger than the window and one centimetre in thickness, are introduced one by one, between the gibbosity and the sides of the opening.

may be effaced in from 6 to 12 months ; this will depend upon the degree of the compression.

But the cure of Pott's disease, firm ankylosis, is hardly ever secured before 3 or 4 years—sometimes sooner, often later. It depends upon the general treatment and the gravity of the tuberculosis.



Fig. 314.—One introduces thus from 8 to 10 of these pads of wool, which form a prominence, the highest point of which is at the centre.



Fig. 315.—Flap of the opening closed down over the wool. It is locked with a little key *ad hoc*. This is the corset as it is worn.

At any rate, one ought not to discontinue compression until the welding is complete and, even, has been completed for 1 to 2 years.



**How do you Decide that Ankylosis has Occurred?**

The problem is the same, here, as after correction of a deformity in hip disease or of white swelling of the knee. To obtain evidence of it there is the use of the X-rays, which



Fig. 316.—Double gibbosity. In such a case a single opening is made corresponding to the two gibbosities and to the intervening segment, and compression is applied by means of three large pads (of which the dimensions exceed, as usual, those of the opening in the plaster).

shows the formation of the anterior callus (see fig. 229). But it is difficult to obtain clear images of the profile, and moreover the great majority of practitioners have not a radiographic installation at their disposal.

In default of the X-rays, there is the **clinical proof** indicated before, namely, **perfect general condition, strict local treatment which has been continued already three or four years, absence of pain on pressure, a rigid back showing no signs of having bulged not even by one millimetre, for more than a year.**

Remember that it is better to err by excess rather than by default of precautions; continue the use of the apparatus two years too long rather than discontinue its use two months too soon.

And then, when it is taken off, it must be taken off only temporarily, for a day or two at the commencement; therefore look at the patient fairly often, and at the first sign, that is to say, at the first pain or slight visible flexion of the back, replace the apparatus for a fresh period of two years.

#### (b) Old Gibbosities

I have not advised practitioners who are not specialists to undertake in a general way the treatment of extensive and old gibbosities, and have explained why. It does not follow that a specialist can do everything in these cases. He will succeed (but at the price of what efforts!) in effacing, in course of time, two-thirds or three-quarters of the gibbosity, even when it is ankylosed. We know, in fact, that ankylosis is never complete before a number of years. On the other hand, experience allows us to affirm **that it is possible, even when ankylosis is complete,** to modify, in 3, 4, or 5 years, **the shape of the osseous mass,** provided that the patient is a child whose growth has not ceased.

In fact, this osseous mass undergoing, from the fact of our treatment, a continuous pressure behind and a relaxation in front, will finish by becoming atrophied behind and hypertrophied in front. We are able thus, in a very notable degree, to regulate and direct its development, to steer it in a direction opposite to that it would have followed if it had been left to

itself. For cases of very marked and old gibbosities, one can say in all truth that **the more the treatment is prolonged**, say, up to the end of the growth of the patient, **the nearer it will approach perfection**, without of course reaching it. The

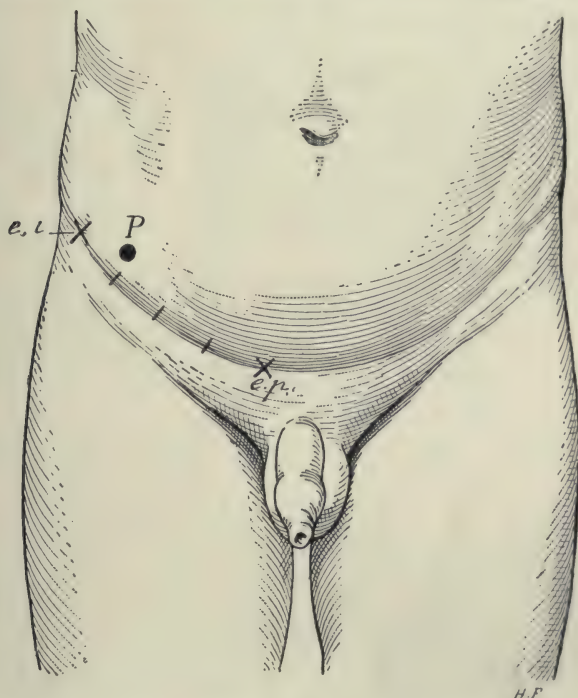


Fig. 317.—Psoas abscess. *e.i.* anterior iliac spine; *e.p.* pubic spine; P. point of election for puncture.

length of treatment here depends then upon the result we are striving for.

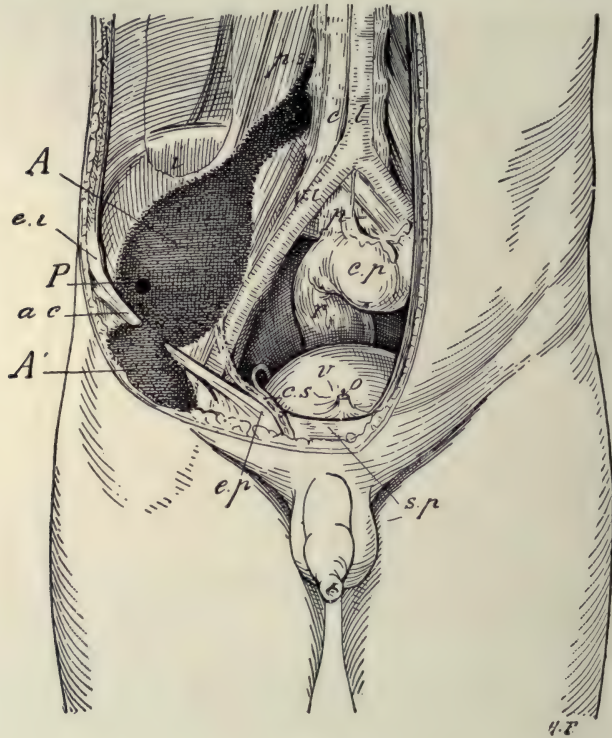
In subjects who have arrived at the end of their growth—when the gibbosity has become welded—there is nothing to look for by correction; one would gain nothing, or next to nothing.



### B.—TECHNIQUE OF THE TREATMENT OF ABSCESS

An abscess exists ; you know where and how to find it.

I have mentioned in what case to abstain from interfering with, and in what case one ought to touch, an abscess. To touch it does not mean to open it ; that, never ! It is especially



PSOAS ABSCESS.

Fig. 318.—*e.i.* anterior iliac spine ; *e.p.* pubic spine ; *s.p.* pubic symphysis ; *a.c.* crural arch ; *c.s.* spermatic cord ; *v.* bladder ; *o.* urachus ; *p.* sacral promontory ; *v.i.* iliac vessels ; *c.p.* pelvic colon ; *c.l.* lumbar colon ; *A'A'* abscess of wallet shape ; *P.* point of election for puncture.

when it is a question of abscess due to Pott's disease that it is not advisable to open it nor allow it to open, because here, more than anywhere else, to open it may mean, and most often will mean, death.

If Pott's disease were so often fatal in former times, it was because the abscesses were opened. And if Pott's disease of

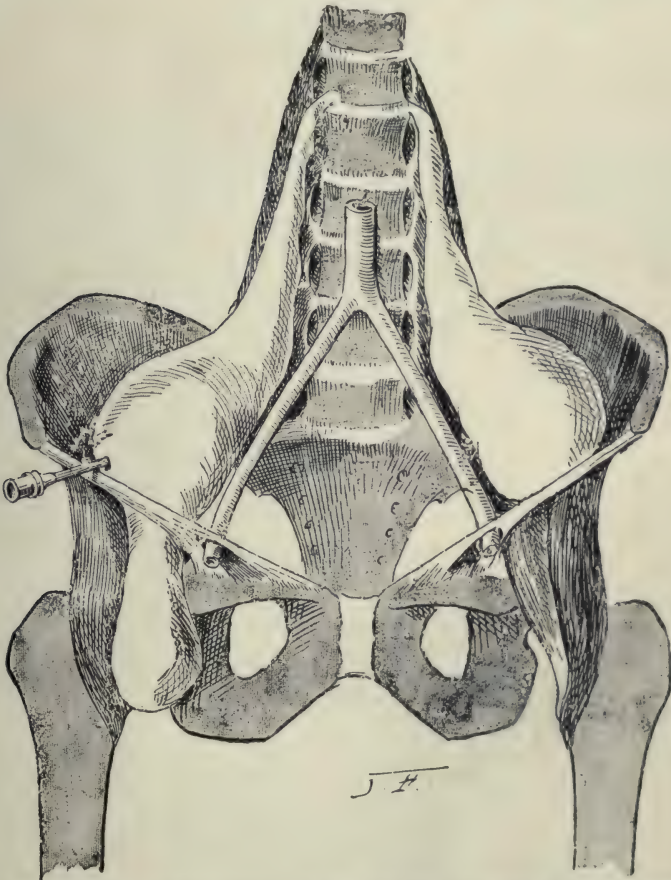


Fig. 319.—Abscess by gravitation. On the left side, the abscess has invaded a considerable portion of the internal iliac fossa; on the right side, the pus has followed the psoas beneath the crural arch and formed a sac on a level with the lesser trochanter. The needle has been pushed against the upper edge of the arch into the pelvic sac of the abscess.

the lumbar vertebræ was considered as more serious than Pott's disease of the dorsal vertebræ, the former being nearly always

fatal, whilst the latter was scarcely ever so, it was due only to the fact that the first is accompanied by accessible abscess which one might hasten to open, whilst the second, presenting

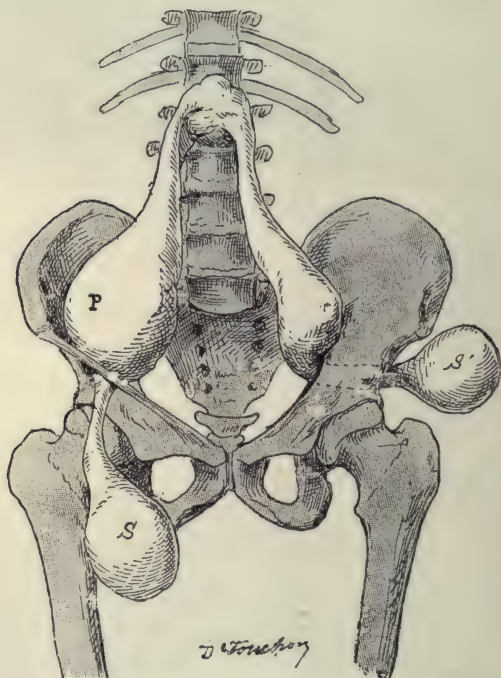


Fig. 320.—Two abscesses of wallet form. On the right the abscess is gripped under the arch and is pointing at the inner aspect of the thigh ; on the left, it has passed through the great sciatic foramen and found its way into the buttock. To puncture at S, S' would not always be sufficient ; it would be necessary to puncture also at P, on the right side, close to the arch. On the left, treat the sac S' and compress it ; if the pelvic sac is not cured, the pus will collect gradually in the internal iliac fossa, where you will be able to attack it in course of time.

no perceptible abscess, would escape the bistoury and its disastrous consequences.

Therefore, the sovereign dogma, the supreme dogma, is never to open an abscess in Pott's disease. The results of operative surgery in such cases are simply disastrous. And of



all operators, the most brilliant, the most audacious, the most intrepid, will be here the most dangerous.

What must be done, then ?

Well, it is very simple. If the abscess remains deep and not easily accessible, do nothing, wait. Two things may happen ; either it will be reabsorbed spontaneously, or it will grow larger



Fig. 321.—Puncture of an iliac abscess, through an inlet made in the plaster apparatus ; one pushes aside the flaps of jersey, and carefully protects with compresses of sterilised gauze, the edges of the inlet, as was represented in fig. 111, 122 and 124 (Chap. III.).

and become accessible. From this moment, and without waiting for it to involve the skin, treat it by puncture and injection.

I have only a word to add *à propos* the peculiarities which abscesses in Pott's disease present.

1. The abscess in Pott's disease may, in rare cases, be infected from the beginning, independently of any surgical interference, small or great, independently of any rent in the skin.

The infection in this case comes from within, from the contiguity of the intestine (rent or not). But be not afraid, for you will scarcely ever see this, as, personally, I have seen it but 6 times in 20 years.

Signs of infection: Evening fever with marked morning remissions; the contents of the abscess becoming sanguinolent, of the colour of tomato, or of wine lees.

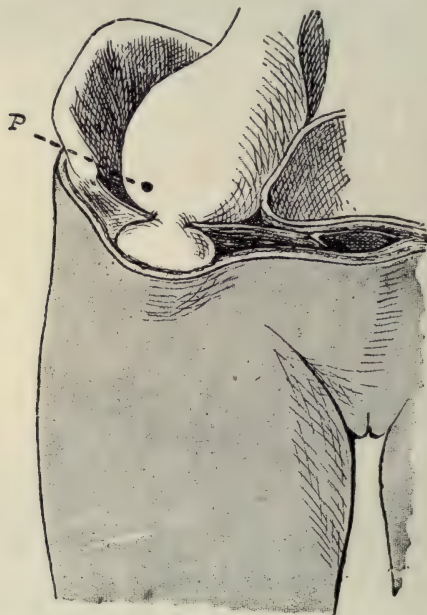


Fig. 322.—Abscess in the form of a mushroom or wallet which has perforated the deep layers of the abdominal wall and is spreading under the skin; in this case, it would be better to puncture the principal sac, as indicated by the dotted line P.

Try to reduce the temperature by punctures without the usual injections. I succeeded once, but in five other cases, in order to overcome the fever I was obliged, after some time, to open the abscess. Indeed, such opening must not be delayed too long, as the viscera might, in course of time, become irremediably infected. Therefore, when the fever has persisted for

15 days, and you are certain it is not attributable to any inter-current malady, do not wait, open and drain the abscess. Then treat as for infected fistulæ.

2. Take care, in treating abdominal abscesses of Pott's disease not to inject diffusible liquid producing too great a tension (iodo-formed ether, oxygenated water). In spite of the fact that these

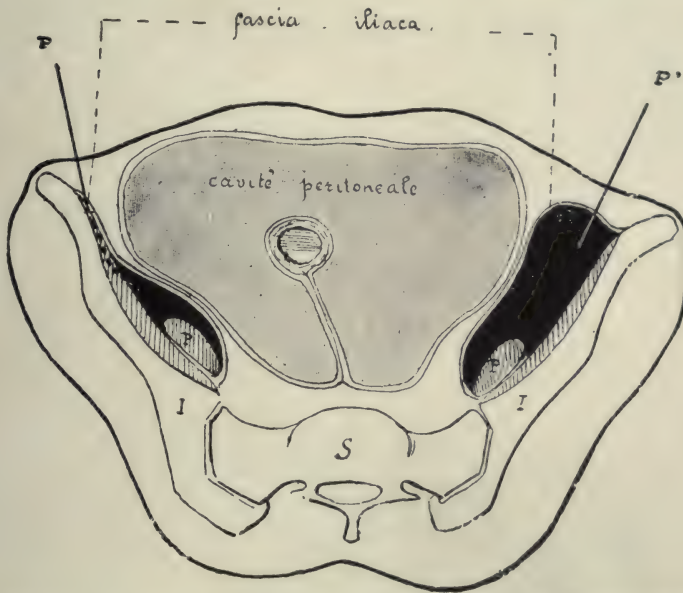


Fig. 323.—On the right, a large abscess has invaded the whole of the iliac fossa and pushed inwards the intestinal mass, so that there is no risk of wounding it by puncture. On the left the needle P' has been pushed in close by the iliac spine; its point travels, grazing the bone (following the dotted line), into the purulent collection.

very diffusible liquids may appear *à priori* preferable here, in that they would more certainly reach the affected points, they are to be avoided, because they might penetrate by breaking through into a visceral cavity, especially when its wall has become attenuated.

3. When an abscess presents a principal sac and several



diverticula, puncture the sac or diverticulum which is most accessible, making sure that you empty the entire abscess. If not, make punctures and injections into the large cavity as well as into the diverticula.

**Peculiarities of Technique according to the Seat of the Abscess**

**A. The abscess is situated near large blood-vessels.**

At the fold of the groin, or in the cervical region (fig. 137 to 140, p. 144).

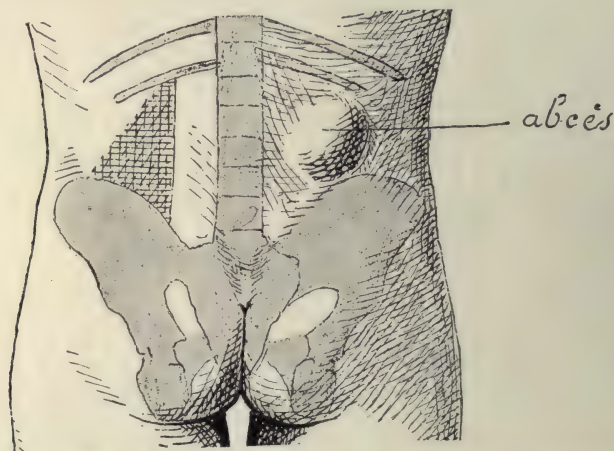


Fig. 324.—Abscess in Petit's triangle (figured on the left by cross-hatching).

**B. Abscess of the iliac fossa.**

You will generally interfere only in the case of a very superficial bulky abscess, that is, one in which you can introduce the needle without having anything to fear—I might even say anything to avoid.

But it may happen that one is unwilling to wait for the collection coming so near the skin, because that requires sometimes one or several years. It is **allowable to expedite matters provided**, however, that the abscess is already **sufficiently large**—as large as the closed fist, for example—

and **undoubtedly in the iliac fossa**. Do not forget that these collections are seated at the commencement in the very sheath of the psoas.

To reach the abscess before it has come near to the surface take care to conduct your needle **immediately above the crural arch** and push it in, not directly from front to back, but upwards, at an angle of  $20^\circ$  or  $25^\circ$  (fig. 323).

You will feel when you arrive in the sheet of liquid.

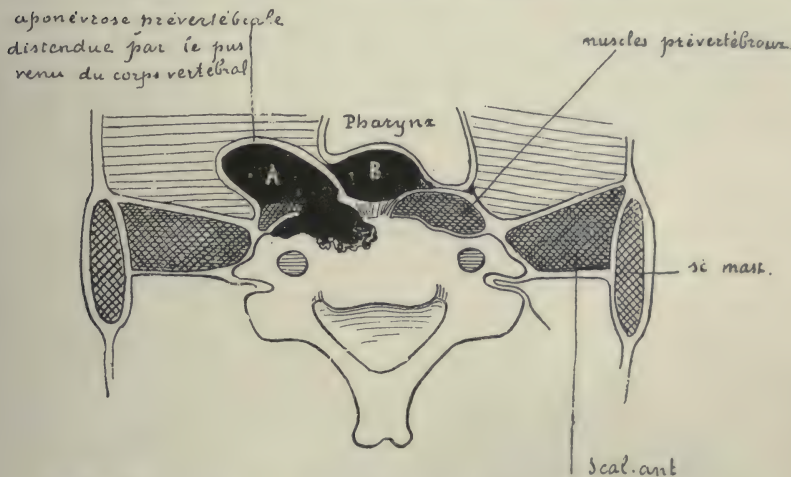


Fig. 325.—A. Abscess of vertebral origin situated behind the periosteum.  
B. Glandular abscess situated in front of the periosteum.

### C. Retro-lumbar abscesses (see fig. 324).

The technique here does not present any difficulties.

### D. Retro-pharyngeal abscesses (fig. 325).

To open these abscesses, as is done unfortunately very frequently, is **nearly always fatal**, death being due to **infection**.

Do not touch them, unless your hand is forced by symptoms of dysphagia or asphyxia—in which case you should not open the abscess, but you should puncture it.

You puncture it through the lateral parts of the neck, even when the abscess is not perceptible there.

#### Technique of the Puncture of Retro-pharyngeal Abscess

To be quite sure of the immobility of the patient, anaesthetise him (unless you are dealing with a very intelligent adult).

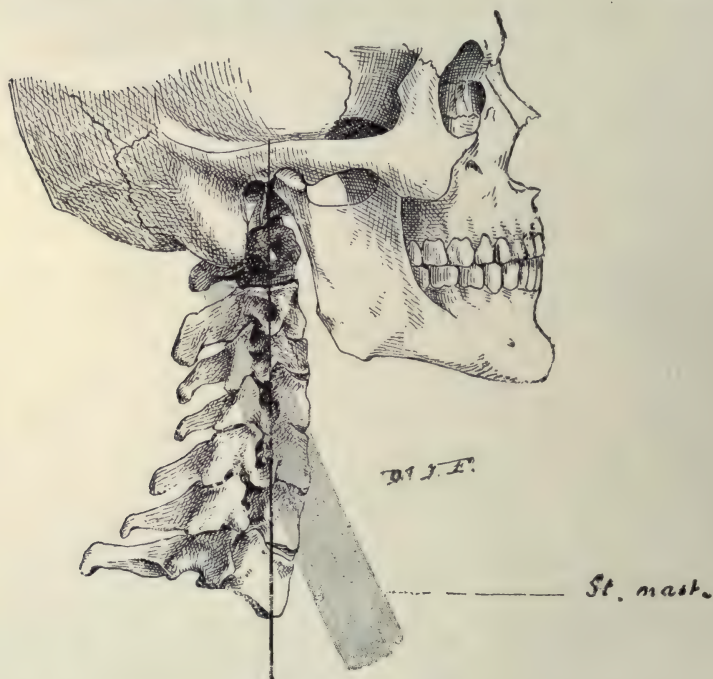


Fig. 326.—In order to puncture retro-pharyngeal abscesses, one marks out a line over the transverse apophyses. The line of the apophyses of the first four cervical vertebrae is found to coincide with a vertical line running down from the external auditory meatus. One finger will push the sternomastoid muscle forwards.

You puncture against and in front of the **transverse process** of the axis, or of the **third vertebra**, which one feels quite **easily** (fig. 326); the needle **grazes the bone** and remains consequently **well behind the vessels** from which it



is separated by the small prevertebral muscles (longus colli, rectus capitis anticus and obliquus superior) and thus arrives at the collection (fig. 327 and 328). Puncture, then inject oil, creosote and iodoform rather than naphthol, because a single injection of oil is often sufficient to cure the abscess. You will rarely have to repeat this delicate operation.

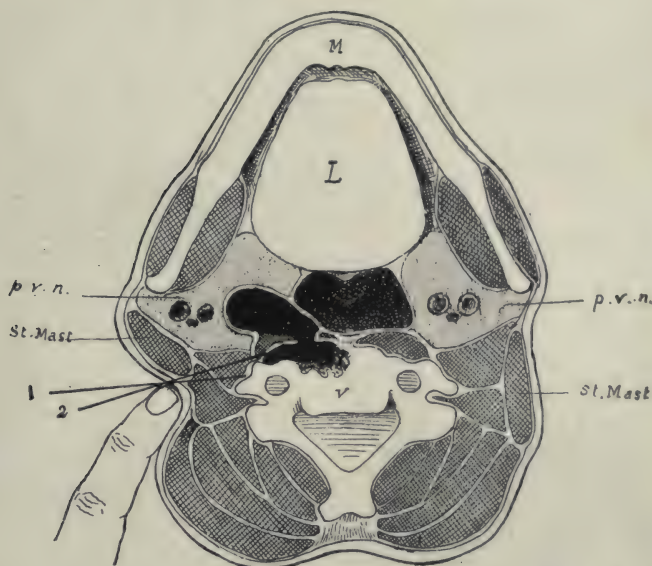


Fig. 327.—Puncture of a retro-pharyngeal abscess occurring in the body of the third cervical vertebra and not manifesting itself by any clinical sign in the lateral parts of the neck; M. Inferior maxilla; L. Tongue; V. Vertebra; *p.v.n.* carotid sheath. The needle is pushed in front of the transverse process; it grazes the bone, taking first the direction 1, then the direction 2.

### Duration of treatment of an abscess in Pott's disease.

The cure may be obtained in two months; but it is not necessary to go so quickly, take rather 3 or 4 months by making a puncture every 15 days (which minimises the distress to the patient).

**Will the abscess return?** No, scarcely ever, provided that the general health is good and that you do not allow the patient to walk about before 6 or 8 months. If it should return, you again treat it in the same way.

**What is the effect of treatment and cure of the abscess upon the treatment and cure of the Pott's**

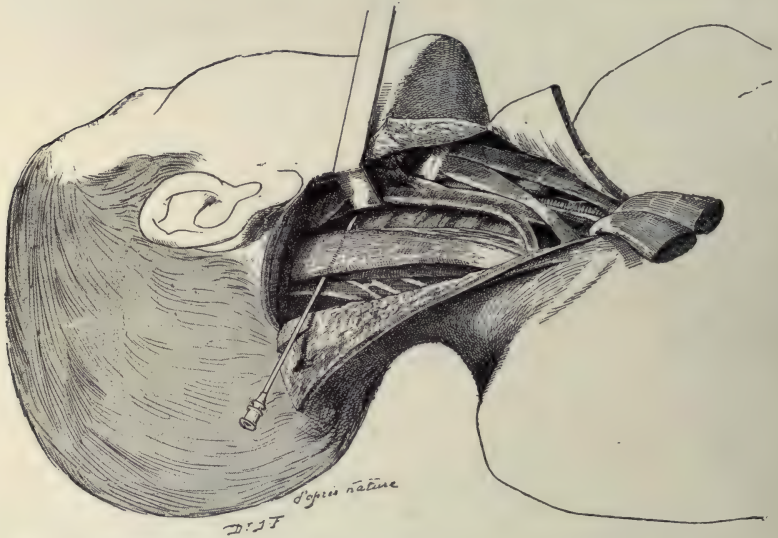


Fig. 328.—To show the track the needle follows we have made on the cadaver some dissections of the region after the needle was introduced; one sees that it has penetrated within a hair's breadth of the anterior surface of the vertebræ, passing behind the prevertebral muscles; the carotid sheath which was lying in front of the muscles has been drawn inwards and forwards to allow of the point of the needle being seen.

**disease?** When the abscess is found to be in communication with all the affected vertebral bodies, it is evident that the liquid injected into the cavity comes in touch with all the affected points, penetrating the tuberculous granulations, dissolving them (naphthol), or transforming them into hard tissue (iodoform), and by repeated and continuous action will eventually disinfect the whole of the actively diseased tissues and

thus ensure the cure of the vertebral focus itself. It is certain, then, that from the point of view of duration of the disease, one gains something by having an abscess by gravitation.

### C.—TREATMENT OF FISTULÆ IN POTT'S DISEASE

We have described (p. 220) how infected fistulæ are distinguished from non-infected.

In the **non-infected fistulæ**, make modifying injections of creosote, of iodoform and of camphorated naphthol, in the form of liquid or of paste—as we have explained in Chap. III. (see p. 171).

In the **infected fistulæ**, on the contrary, do not use modifying injections; they would be harmful.

In such cases, if there is no fever, you must learn to patiently await their closure with, as the only treatment, aseptic dressings, rest, overfeeding and a sojourn at the seaside.

If the fever exceed  $101^{\circ}$  and persists beyond several weeks, endeavour to reduce it by improving the drainage of the pus.

But take care (should the drainage be not sufficient) not to have recourse to great surgical interferences, on the pretence of making radical cures, because those operations offer twenty times more chances of aggravating the infection and the condition of the patient than of ameliorating them.

*Primo non nocere*: an operation, necessarily incomplete here, would redouble the septic absorption and infection. Whilst if you do not operate, you leave the patient with a *chance of cure*. Sometimes, indeed, you will see him cured.

Too often we shall be powerless; the fever will persist and will, little by little, in several months or several years, cause in those patients visceral degeneration and death. For this reason, I wish to repeat it over and over again, you must do all that can be done to avoid fistulæ—namely, never open an abscess, and, by every means, prevent it opening spontaneously.

Nevertheless, all the fistulæ in Pott's disease have not the same sombre prognosis; it is much less rare, for example, to



see those of the neck cured than those of the lumbar region, owing to the relatively superficial position of the vertebral bodies of the neck, hence the greater facility of complete drainage in that region (see p. 220).

**Orthopædic treatment** of fistulæ in Pott's disease.

Plaster the patient in order to immobilise the diseased focus and to lessen pain, which is often severe. The apparatus should have an opening in it to allow of dressing—or it may be bivalve and removable (see p. 345).

*Medical treatment of symptoms* : if there is albuminuria, milk regime. If there is fever, cryogenine, etc.

**D.—TREATMENT OF PARALYSIS IN POTT'S DISEASE**

The indication, as I have already pointed out (p. 266), is to remove pressure from the cord.

In that way, the causes of the paralysis external to the cord are acted on, as well as the nutrition of the cord itself.

This is effected simply by the application of a large plaster. At once there is relief from the pressure on the cord by the slight extension made during the application of the plaster, and this relief is further augmented by the pressure made afterwards upon the gibbosity.

The apparatus should be constructed with the trunk in a vertical position, but *supported* (see fig. 246, p. 272), as shown by my assistant, Dr. Privat, in such a way that there is not too great traction on the head. Complete suspension would be painful, badly borne, and might give rise to sloughing.

If, on the other hand, the patient remain seated, he will not be fatigued, and you can leave the apparatus to dry with the trunk in the vertical position. It is the best position for its correct application and for producing its full effect, so that there is no injury to the tissues, generally in a poor condition.

When the paralysis has extended to the loins, sores may appear on a level with the pelvic girdle if the plaster is not

very exactly applied, and produces, by its roughness, abnormal pressure at certain points.

Note that in the **case of incontinence** of the intestine and bladder, the plaster is easily soiled. It is necessary to take a thousand slight precautions to avoid such soiling and, from time to time, to take off the softened portions and replace them by new strips and new plaster squares, by which means it is possible even in the case of extensive paralysis, to preserve the apparatus which is so useful in relieving pressure on the cord.

**Treatment of symptoms.**—If there are contractures of the limbs, you may combat them by continuous extension, or by small plaster apparatus. You contend against constipation by suppositories, simple enemata, etc., and against bladder retention, by diuretics, which suffice nearly always, without catheterism (see p. 68, the treatment of **sloughs**).

#### SUB-OCCIPITAL POTT'S DISEASE

Authors devote a special chapter to the treatment of this peculiar condition. That seems to me perfectly useless, for there is nothing about it which is not contained in the preceding pages, either as to orthopædic treatment (see large apparatus), or as to the treatment of abscess (see p. 337, retro-pharyngeal abscess), or as to the treatment of paralysis.

#### POTT'S DISEASE IN THE ADULT

In the same way we do not see any necessity for adding a chapter on Pott's disease in the adult, in spite of its rather great frequency (even at an advanced age).

It is sufficient to know that the absence of gibbosity is less rare in **Pott's disease in the adult** than in that of the child; that the **disease is announced more often by spinal pains or girdle pains of terrible acuteness**; that **these pains may precede by several months, and even by one or two years, the appearance of the gibbosity**;

and that **such unexplained sufferings should make you think** (even without a gibbosity) of a **possible Pott's disease**, for the other signs of which you will search (see diagnosis, p. 240). **Think also of Pott's disease, in the presence of every cold paraspinal abscess, or of paralysis** supervening without appreciable cause, in the adult as in the child.

The **treatment** is the same as in children.

It is necessary however for us to accord special attention to these cases of Pott's disease in the adult which **go on** for eight, ten or fifteen years, with girdle pains or pains in the members, remittent or continuous pains which often resemble rheumatic pains. (This **form** is seen **also in children, but much more rarely than in adults.**)

What is to be done for this, fortunately, exceptional form ?

We cannot condemn these patients to the recumbent position for fifteen years ! Let them walk about, but not without a good corset, and forbid all fatigue.

You will contend directly against the symptoms of pain by counter-irritation over the spine or over the limbs, by the cautery, and by continuous extension of the lower limbs, made during night, etc.

We shall see that these forms of dry caries, which persist indefinitely, can be found in other parts of the skeleton. But, in the spine, the pain may be due to another cause.

#### **Treatment of Gibbosities in the Adult**

(a) *Gibbosity which is in progress* (with all the signs of a vertebral focus still in activity) : one arrests and corrects it as in the child.

(b) *Gibbosity already ankylosed* (one which has not increased more than a millimetre for at least two years, but which offers at the same time the other signs of an extinct Pott's disease) : there is **nothing or almost nothing to hope for in attempting its correction.** But you will nevertheless put on a corset if the patient complains of erratic pains, in order to endeavour to minimise them ; for it is possible *even in Pott's disease which is welded and extinguished*, to have neuralgias of the trunk and of the limbs, due to pressure on



the nerves at their exit from the spine—the cause of the pressure persisting for a longer or shorter time after the cure of the tuberculous focus.

The bivalve plaster (see p. 346) renders some service in adults intolerant or emphysematous.

#### POTT'S DISEASE CO-EXISTENT WITH OTHER TUBERCULOUS AFFECTIONS (*hip disease, etc.*)

In all these cases you will treat the Pott's disease by a corset (plaster, at first ; celluloid, later).

If it is a coxitis (see p. 367) without pain or deformity, extension will be sufficient to keep the leg in good position. If, on the contrary, there is pain and deformity, make a plaster which you can join on to the plaster corset. In all other cases (see p. 671) you will carry out the treatment of the two affections at the same time.

### APPENDIX TO CHAPTER V

Three additional notes upon the treatment of Pott's disease.

#### **1st. The removable plaster corset.**

It is very easy to construct. Make an ordinary plaster corset, using cold water without salt, and when dry, after a few hours, or the next day, divide it by symmetrical lateral incisions, into two valves, anterior and posterior (fig. 329).

To avoid the risk of damaging the skin in cutting the plaster you will place over the jersey, in the course of the four lines previously chosen for the incisions, woollen strips, or, better, zinc strips, the same as those used for moulding.

The jersey, which remains adherent to the inner surface of the apparatus, will serve as a natural lining.

In order to apply the removable plaster corset, you replace the two pieces, so that they are in perfect contact at their edges, and you keep them so either with straps, or with some turns of gummed muslin, moist and squeezed out ; better still, with laces passing round dressmakers' hooks. These are stitched to strips of linen which have been fastened to the edge of the apparatus with the plaster cream, or with silicate, or even with ordinary glue (fig. 331).

You should use the removable apparatus only in exceptional cases, namely,

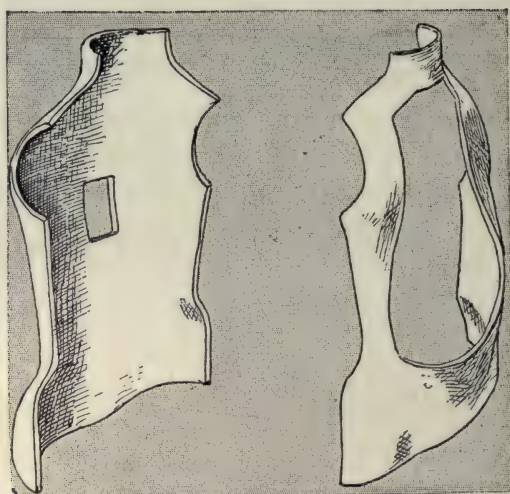


Fig. 329.—A medium bivalve plaster.



Fig. 330.—Strip of linen with hooks which is glued to the edges of the plaster.

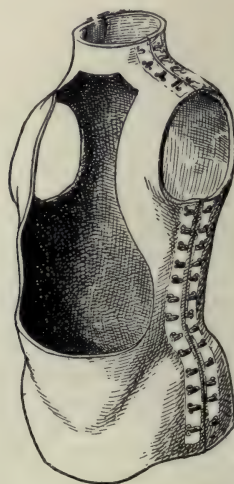


Fig. 331.—Removable plaster, completely finished.

where there are numerous fistulae, or a skin needing daily attention, or again, in an emphysematous or neurotic person who will only be able to become accustomed to the plaster gradually, keeping it on at the beginning for a few hours only every day.

### **2nd. Upon sloughs.**

We have described (p. 65) what are their causes, their situation and their treatment. We have only one more word to add here.

If the slough is situated over a gibbosity, do not cease compression for a single day; for, if the compression is **regular**, it will not hinder the cure of the child, and thus you will have lost nothing from the point of view of correction of the gibbosity. If the slough is situated at the chin, you make a notch in the plaster at this point to allow of its dressing. All this you anticipate.

### **3rd. On the use of chloroform in applying the plaster.**

Sometimes little children throw themselves about violently in the suspension apparatus; to prevent traumatism of the morbid focus, anaesthetise them. You may put them to sleep in the upright position, held by the strap, immobilising firmly the head and trunk, during the first whiffs of chloroform.

Contrary to what is generally thought, chloroform is wonderfully well tolerated in an upright position, when the chin is kept raised as it is by the girth. The last bandage being rolled, you lay the child on the table to dry the plaster, for if it should dry in the upright position, under the anæsthetic, the trunk would be too much extended. Hence, a little risk later on of a slough beneath the chin (if you are preparing a large corset), and the apparatus might perhaps be too tight.

You may also, in order to lessen the traction produced by the weight of the body, put children to sleep, and apply the plaster in the **sitting position** rather than in the **upright**.

That will be better so. Restless children can (like cases of Pott's disease with paralysis) be kept seated on a bicycle saddle, as represented in fig. 245, p. 272.



## CHAPTER VI

### DISEASE OF THE HIP-JOINT

*A word on the symptoms, the prognosis and diagnosis of hip-disease*

HIP-DISEASE is tuberculosis of the hip-joint.

The minute tubercle may remain at rest for several months, then, one fine day, it makes itself known by certain **pains** in the hip **or the knee**, or by a slight **limp** (due to cramp in the peri-articular muscles).

#### Clinical Characters

**A. Deformities.**—The pains and the limp, intermittent at the beginning, will soon be almost continual; and a deformity appears, scarcely appreciable at first, then very distinctly. There is a saddle-like curve in the lumbar region, produced by flexion of the thigh; there is a slight lengthening of the leg, produced by abduction of the thigh.

Thus, **at the beginning** of hip-disease, the **affected leg appears to be the longer**, because it is in abduction. **Later**, the affected leg will appear the shorter, because it will be adducted.

At the last period of the disease it will often be **really shorter** by reason of atrophy of the bone and partial destruction, or even complete destruction, of the articular surfaces.

**B. Abscess.**—The tuberculosis may break down the barriers of the articulation and be carried towards neighbouring parts, in all directions, leading to abscesses which, if they are not prevented, will cause ulceration of the skin and open outwardly, producing fistulæ.

**C. Fistulæ.**—These easily become infected, hence there is danger to life, not so great, however, as in the case of fistulæ in Pott's disease.

**D. Luxations.**—By reason of the wearing away of bone and the articular dislocation brought about by the tuberculous process,

not only deformities, but veritable luxation of the femur upwards and backwards may occur.

The disease will thus terminate with deformity and very ugly shortening unless the patient is carried off by the visceral degenerations caused by the infected fistulæ.

What one knows very well, however, is that hip-disease does not follow this course unless it has not been properly looked after (at least not carefully), and that, even in the case where it has not

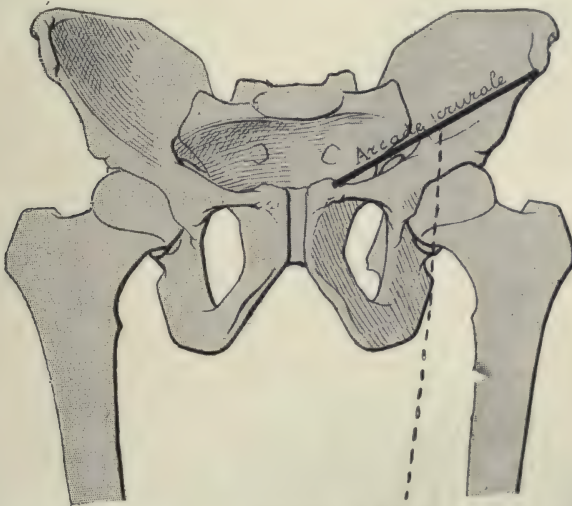


Fig. 332.—Normal hip-joint. The relations of the crural arch and the artery to the joint.

been treated at all, it may be arrested spontaneously at some one of the stages already indicated.

### Prognosis

But the prognosis of hip-disease changes altogether when it is well attended to.

1st. We can prevent or correct the deformity and thus prevent luxation.

2nd. We can prevent the opening of abscesses, which means the formation of fistulæ; and in doing away with fistulæ we do away also with the great danger to life which threatens the patient.

3rd. We can prevent the destruction of the articular extremities in hip-disease when the case is taken in hand at the beginning.

But that which we are unable to prevent absolutely in every case, is the stiffening of the hip-joint, or, again, the formation of an abscess and the production of a certain amount of atrophy of the bones of the lower limb, the consequence of which is slight shortening.

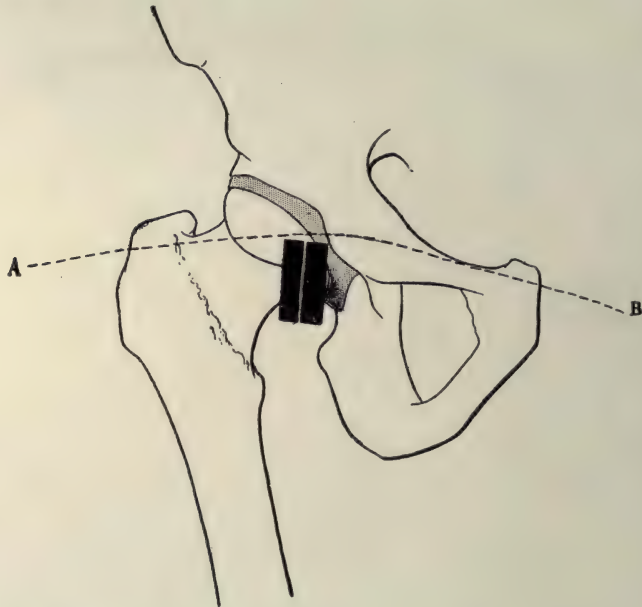


Fig. 333.—The normal hip-joint. Relations of the head of the femur to the vessels. The stippled part above the accessible zone of the head represents the cotyloid ligament. The two thick dark strokes are the artery on the outer side, the vein on the inner. The artery crosses the head at the junction of its inner third and outer two-thirds.

Nevertheless, shortening and ankylosis will not supervene, except in neglected patients, and in some cases of hip-disease of a serious character; in the other cases we can, if we have attended to the patient very early, secure him a normal or reasonably normal limb; moreover a coxalgic, cured with a shortening of one or two centimetres and a stiff hip-joint, is able to walk well for a length of time and correctly.



### The Duration of the Disease

It lasts approximately one year in the benign forms; from two to three years in the ordinary forms,<sup>1</sup> with or without abscess—and 4, 5, 6, 7 years and more in certain forms of dry caries without abscesses, which progress with an extreme slowness and seem to go on for ever.

### Diagnosis

This is only difficult sometimes, at the onset of the disease.

*Aphorism.*—When you are consulted with regard to a child

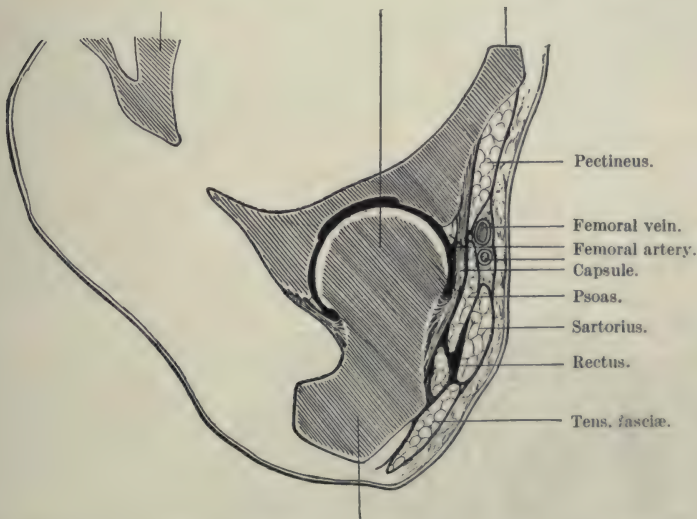


Fig. 334.—Normal hip-joint. Horizontal section of an upright subject through the line AB in the preceding figure.

or an adolescent who, without appreciable cause, has been taken with **limping** or **pain** in the hip or in the **knee**, think of the possible existence of hip-disease and satisfy yourself of the correctness of your suspicion, by examining the subject completely naked.

Make him lie flat on a table and find out if he has pain on

<sup>1</sup> We shall see that with early injections the duration of hip-disease is reduced by more than two-thirds.

pressure of the hip, or a limitation of movement, particularly of the movement of abduction.

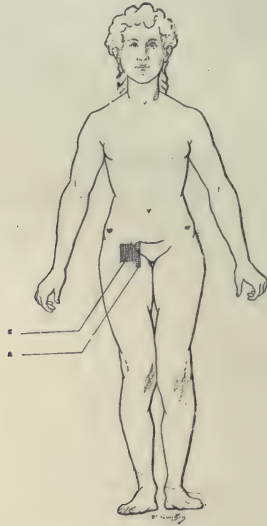


Fig. 335.—a. Femoral artery. z. Zone outside the artery, where one must press in seeking for pain on pressure of the head of the femur.



Fig. 336.—One presses with the index finger in searching for pain.

1st. *Look for pain on pressing the head of the femur (see fig. 335 to 337). Run your index finger in front of the suspected hip-joint, along the fold of the groin, at one centimetre outside the femoral*



Fig. 337.—Examining the sensibility of the head of the femur by pressure over its outer side. The index finger is pushed inwards at a centimetre above the upper border of the trochanter.

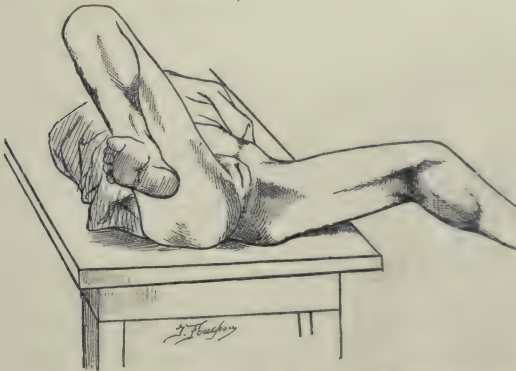


Fig. 338.—The *second sign* of any kind of arthritis of the hip. Here one sees limitation of abduction on the right side (affected side) compared with extreme abduction on the left (sound) side.

artery, which you will feel beating. You are right over the head of the femur.

Press upon it gently : if the patient gives a cry it is useless to



persist ; otherwise, press more firmly until the patient complains. And find if, on making an identical pressure over the head of the femur of the other side, at a corresponding point, you provoke an exactly similar sensation there.

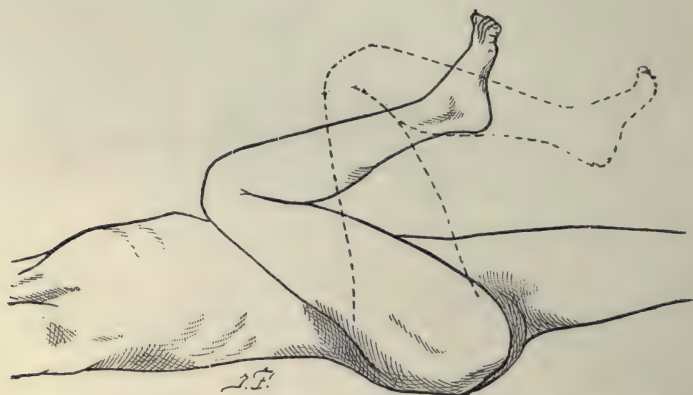


Fig. 339.—Limitation of movement of flexion represented by the dotted line. The printed lines show the extreme normal flexion.

Do this again, if need be, five times, ten times, pressing first on the one side, then on the other, until you are certain whether there is or is not a difference between the two sides.

2nd. *Search for limitation of movements* (fig. 338, 339, 340). You

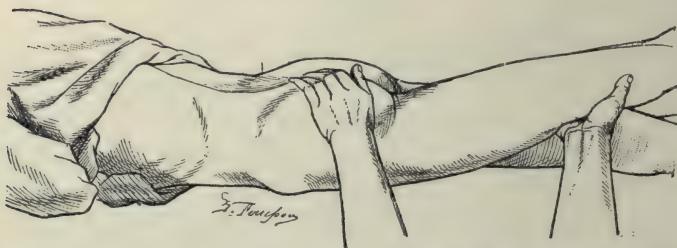


Fig. 340.—Limitation of movement in extension and the manner of making the examination.

fix the pelvis with one hand and with the other you take hold of the knee, the leg being flexed on the thigh, and you move the limb in different directions up to the extreme limit of movement possible : flexion, extension, etc. For abduction, you commence

the movement by a direct flexion of the thigh up to an angle of  $90^{\circ}$  ;



Fig. 341.—Lengthening of the affected leg (right). Notice there is no longer only arthritis of the hip of some kind, but true coxitis.



Fig. 342.—Lowering of the fold of the buttock on the side affected indicating also lengthening. On the other hand, the projection of the trochanter is more marked on the sound side.



Fig. 343.—Atrophy of the thigh, another important sign (though not pathognomonic), of true coxitis. The thickening of the skin is the indication of this atrophy of the thigh. The cutaneous fold is thicker on the affected side.

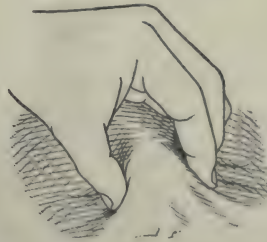


Fig. 344.—Cutaneous fold thinner on the thigh of the sound side.

then, from that you move the thigh in abduction, as far as possible.

Compare the extent of the movements on the two sides ; then again repeat the proceeding, ten times if necessary. If there is **pain on pressure**, and a **limitation of the movement of abduction**, you may be sure that **the hip is diseased**.

But how do you know it is **real coxitis**?

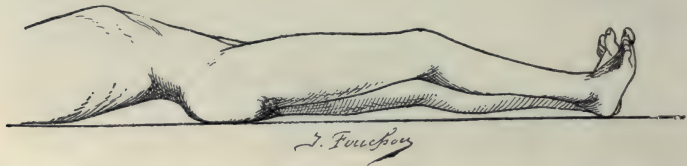


Fig. 345.—The most frequent condition. Lumbar hollowing and flexion of the knee, very apparent on the first examination.

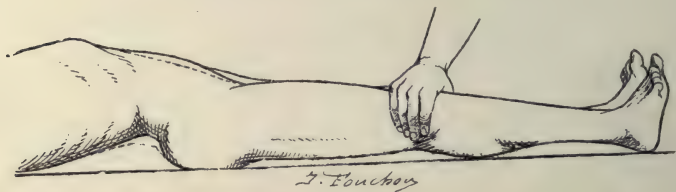


Fig. 346.—The same. The hollowing is more pronounced when the knee is pressed upon (the dotted line indicates the original hollowing).



Fig. 347.—The same. The hollow disappears on flexing the knee further (the dotted line indicates the original hollow).

By the existence of apparent lengthening of the affected limb.

3rd. *Look for lengthening of the limb. (Pathognomonic sign.)* (Fig. 341 and 342.)

Without paying particular attention to the position of the two iliac spines, bring the two heels together and see if the internal



malleoli and the heels are on the same level. If there is a difference of a few millimetres, that suffices to confirm the existence of hip-disease, at the outset; for later, we repeat it, there is, on the contrary, shortening of the affected side.

Failing the characteristic lengthening, you will make the diagnosis by the existence of some small **glands** in the groin of the suspected side, by slight **atrophy** of the muscles, or **thickening** of a fold of **skin** on this side (fig. 343 and 344), by the **absence** of any **history of injury**, or of **scarlatina**, or of **rheumatism**, by the insidious onset and the characteristic intermittence of the symptoms, by the general condition and the bad antecedents of the patient, etc. In doubtful cases, reserve your diagnosis and ask to see the child again. If then you find, after a few weeks, pain on pressure and limitation of movement, you will conclude it is hip-disease.

### Differential Diagnosis

(a) Diseases **some distance away**: *White swelling of the knee*, or *sacro-coxitis*, or *Pott's disease*.

You must **always think** of these, that is to say, after examining the hip-joint, you ought to **examine the pelvis**, the **lumbar region** and the **knee**. If the disease is situated in those regions, it is there and not in the hip that you will find the most apparent characteristic signs; pain on pressure over the bones, limitation of movement, etc.

(b) **Other conditions connected with the hip-joint**: *Osteomyelitis of the hip* begins with great constitutional disturbance and a temperature of from  $103^{\circ}$  to  $104^{\circ}$ , etc.

*Infantile Paralysis*.—There is no rigidity (on the contrary



Fig. 348.—The same. Right coxitis. Abduction and lengthening very apparent on standing upright; the patient bends the knee on the affected side instinctively.

abnormal laxity), no pain on pressure. Atrophy and enfeeblement of muscles greater than in hip-disease. The history.

*Congenital Luxation.*—The affected leg is not longer but shorter; the child was late in walking, has always had a slight limp, a sort of <sup>d</sup>dip; no pain. You no longer feel the head of the femur

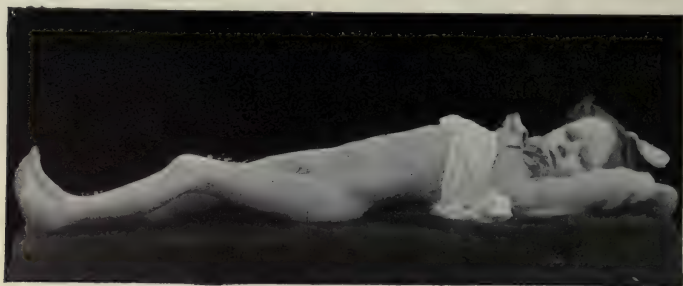


Fig. 349.—Very marked deformity, in abduction, lumbar hollow and flexion of the knee.

in front against the artery; at its usual place there is a void, but you can feel the head more or less displaced, outwards and upwards, against the anterior superior iliac spine (*v.* Chap. XIV.).

*Hysterical Coxitis.*—But this is so rare! Do not deceive yourself! it nearly always masks a true coxitis.



Fig. 350.—The same. The hollow is effaced when flexion of the knee is increased.

*Rheumatism.*—In the hip, as in the spine, mistrust those mono-articular rheumatisms which seem to last for ever. The same remark applies to the so-called "*growing pains*." How many cases of true hip-disease have been, at the beginning, mistaken for rheumatism, growing pains, sprains!

However, do not exaggerate the difficulties of diagnosing coxitis. In reality, there is **generally none** in practice. When you are dealing with a genuine case you will usually notice at your first examination (besides the signs we have already indicated): 1st, a very apparent lameness; 2nd, a vicious attitude characterised by flexion of the thigh and a lumbar hollow, together with abduction of the limb (fig. 345, 346, 347, 348, 349, 350); 3rd, a doughy puffiness of the region of the joint; 4th, a limitation (more than a half) of the physiological movements; 5th, very evident pain on pressure and on movement, etc.; which means that you will find many more signs than are necessary to confirm the existence of hip-joint disease.

#### A WORD ON THE ANATOMICAL LESIONS

BASED UPON RADIOGRAMS IN MY COLLECTION AND ON THE THESIS (*Sur la Radiographie dans la Coxalgie*, Paris, 1906) OF MY ASSISTANT AND FRIEND, DR. FOUCHOU

What you have to keep in mind are the following:—

Placing yourself at the practical point of view, you may distinguish in hip-joint disease **two anatomical forms**; one where the **contour** of the joint and the bony formation are **entirely preserved**; the **other where there is a softening** of the head of the femur and the roof of the cotyloid cavity leading to a **gradual breaking down** of the osseous surfaces, in the course of 2, 3, 4, 5 years.

The first form terminates without shortening, but the second leaves an inevitable shortening which extends generally to 3 or 4 centimetres.

Let us go into details.

The **first variety** comprises the benign and recent cases (see further on upon hip-joint disease of 1st *form*) which have been well cared for from the beginning; here, the lesions are always synovial and the bones are scarcely "touched," if I may say so, by the tuberculous process (fig. 351 and 352).

The **second variety** is more frequently the actual condition



of things ; it comprises hip-joint disease of the second, third, fourth, fifth and sixth forms. The tuberculosis here is more serious, either because from the onset it was essentially more malignant, or, chiefly, because it **has not been looked after** from the first hour of its existence, or else, it **has been badly looked after**.

Tuberculosis sometimes excavates one or several small caverns on the surface of a bone, but this is rare ; more often

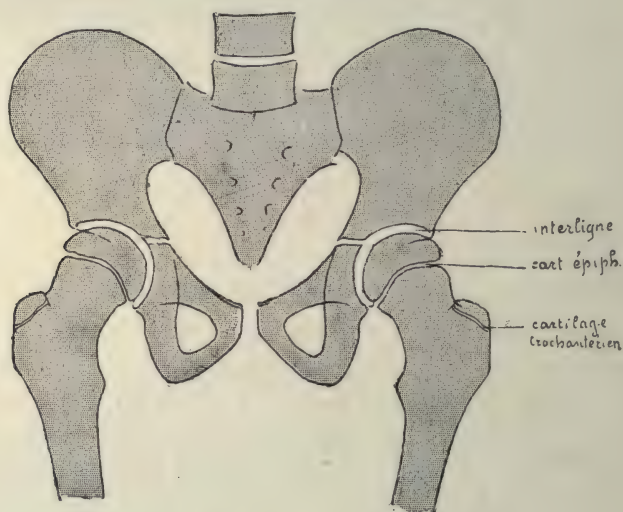


Fig. 351.—Radiogram of a case of left hip-joint disease of the first form, without any appreciable osseous lesion, in spite of the fact that, clinically, the diagnosis was not in the least doubtful. It was very probably a coxitis exclusively synovial.

it produces tuberculous infiltration which **rarefies** and **softens** (like damped sugar) the head of the femur and the roof of the acetabulum : or, again, it may be a question of a rarefying osteitis of the neighbouring bones, which is not tuberculous, but has been produced round a minute bacillary focus.

As a result of this softening, the bones do not suddenly break down but are worn away gradually to a depth more or less extensive. The wearing away is produced especially if the

child walks about, but it also may occur, although in a less degree, in children who are kept at rest.

There belong to this second form, as we have said :

1st. Cases of hip-joint disease of the second variety, that is to say, cases of hip-joint disease which come on with spontaneous and very severe pains, or with a displacement of more than  $20^{\circ}$ .

2nd. All cases of hip-joint disease of the following varieties (which are in reality only coxitis of the second form in a more

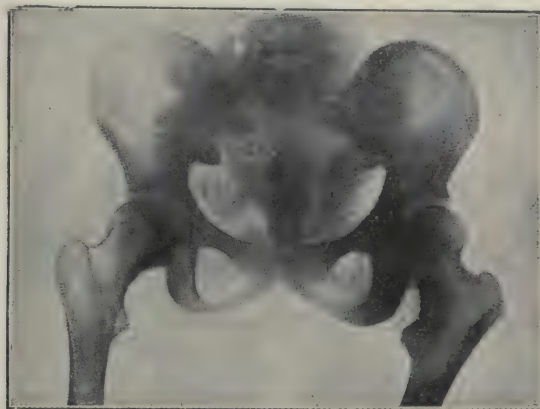


Fig. 352.—Another case of left hip-joint disease of the first form. There is no alteration in the contour of the bone, but only a diffuse decalcification on this side shown by a lighter shade. The femur is in abduction.

advanced state), namely, cases which have suppurated or are fistulous, and those of the dry carious form.

The progress of the lesions and the progressive wearing away of tissue in the second form may be represented schematically by the following figure (see fig. 353).

Without reckoning the examples of extreme destruction which fortunately are exceptional, one may say—and this is what I wish you to remember—that at the present time, and in more than three-quarters of the cases of hip-joint disease cured,

*one generally observes a wearing away of from 3 to 4 centimetres. There is in this evolution of osseous tuberculosis something*

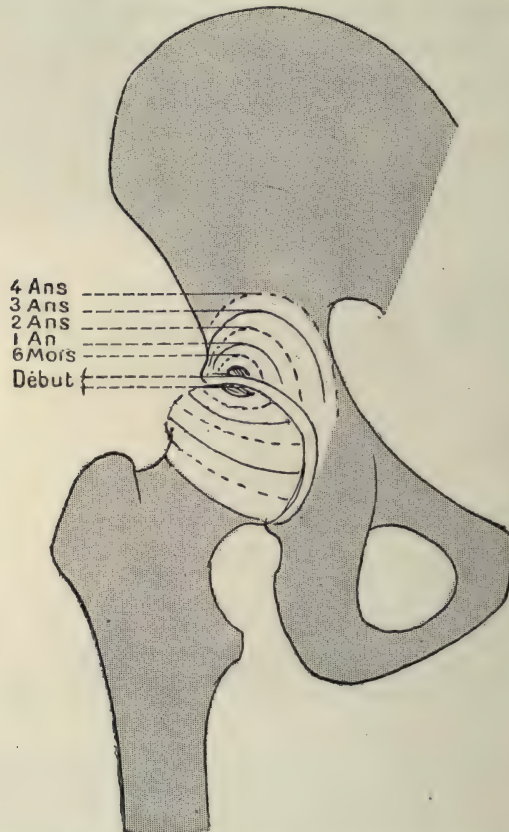


Fig. 353.—Schema of the osseous destruction in the 2nd, 3rd, 4th and 5th forms of hip-joint disease. From the primitive core, the destruction spreads by successive concentric zones as far as the iliac bone and the upper extremity of the femur. The total wearing away of the joint surfaces generally measures 3 or 4 centimetres, and it may attain 5 or 6 centimetres or even more in some cases where the head and neck of the bone disappear almost entirely. Every year brings about a mean destruction of from 3 to 5 millimetres in each direction, but the softening has a progress more or less rapid. The figures indicated here, have, of course, not an absolute value.

peculiar to the hip-joint, and which we have not found in white swelling of the knee, nor of the ankle, where the bones do





Fig. 354.—Right hip-disease at the beginning; marked rarefaction of the osseous tissue, which appears lighter on the affected side. The articular interline is much less distinct.

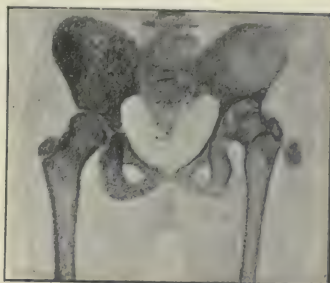


Fig. 355.—A more advanced type. Right hip-disease; notable wasting of the head and neck of femur, and of roof of acetabulum. Moreover, outside the trochanter, there is a dark patch, which was found on clinical examination to be a small abscess.



Fig. 356.—Left hip-disease; Rad. No. 1. The superior edge of the acetabulum is eroded as if scratched with a nail; in the eroded space are seen two small sequestra. The epiphysal body is cut in two showing a gap, which runs from the cartilage to the interline.



Fig. 357.—The same patient at the end of a year, after an abscess had appeared. The acetabulum is very much broken down, its superior border raised; the whole of the epiphysis of the head has disappeared.



Fig. 358.—Old hip-disease of left side with abscess. Considerable enlargement of acetabulum by complete wearing away of middle portion of iliac bone. From this destruction a kind of shrinking and telescoping of all the left half of pelvis has resulted. The head and two-thirds of the neck of the femur have disappeared.



Fig. 359.—Double hip-disease without appreciable abscess (dry caries).

On the right : The head of the femur and the upper half of the neck no longer exist. The middle part of the iliac bone, very much softened, has given way, causing considerable deformity of the pelvis.

On the left : Disappearance of the head of the femur and enlargement of the cotyloid cavity.

not decay and always preserve their contour. We ought to add

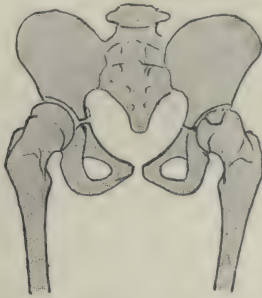


Fig. 360.—Another case on the right side. Erosion of upper part of head of femur.

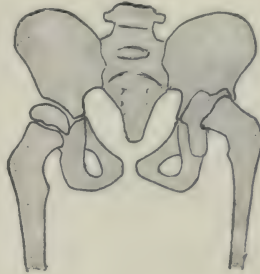


Fig. 361.—Right hip-disease without abscess (dry caries). Complete necrosis of femur and considerable enlargement of acetabulum.

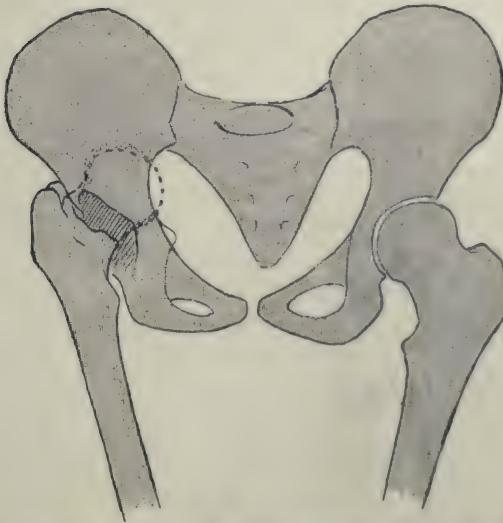


Fig. 362.—Pseudo-luxation. Necrosis nearly complete of the head and neck, the normal limits of which are marked by dotted line in the figure. There remains only a small stump formed by the infero-external part of the neck.

that this wearing away of bone is seen especially in the hip-disease of children. In the adolescent who has completed his



growth, the bone will resist the wearing and destructive process much better, and sometimes even completely.



Fig. 363.—Another type more advanced; complete necrosis of the head and neck. Of the latter there remains only a small process in the form of a spine which is still in the acetabulum. Fibrous ankylosis.

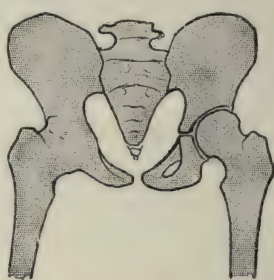


Fig. 364.—Right coxitis. Type of osseous ankylosis in abducted position (osseous ankylosis is rare in hip-disease).



Fig. 365.—True luxation. The head of the femur, or, rather, the small stump which remains of it, is completely outside the acetabulum (the femur is turned round generally in external rotation).

The three preceding figures summarise for you all the lesions of hip-disease. Those which follow are radiograms in some way illustrative of fig. 353.

You will see later (p. 380 and following) that the only

means truly efficacious of altering this evolution of the tuberculous process in the hip-joint and preventing its destruction is to make articular injections, as soon as the disease is recognised, that is to say, before the bones have been seriously softened.

## TREATMENT OF HIP-JOINT DISEASE

The treatment differs with each variety of coxitis. All the varieties may be considered with reference to the six following points :—

1. Without deformity. 2. Deformity. 3. Abscess. 4. Fistula. 5. Dry coxitis, which may be protracted. 6. Coxitis, which is cured with a defect in the member (shortening, ankylosis, luxation).<sup>1</sup>

We will first define and illustrate in Part I. the different varieties, and show you the treatment suitable for each of them. In Part II. we will describe in detail how the treatment must be carried out, that is, how to apply the technique. We will not describe the **general treatment** of tuberculosis. That you know: life in the open air, in the country or by the sea, for two or three years at least, if possible, good feeding, the use of medicines recognised to be useful against tuberculosis, etc.

### I.—FIRST PART. *CLINICAL—THE SIX VARIETIES AND THE THERAPEUTIC INDICATIONS IN EACH.*

#### 1st VARIETY.—HIP-DISEASE WITHOUT DEFORMITY

**Hip-disease at the beginning, without deformity and without spontaneous pain** (fig. 351 and 352, p. 360). (Or with very little pain or deformity, for example, only from 10° to 20° of flexion or abduction).

For all these patients **you** will prescribe **rest in the recumbent position** for eight or ten months at least.

*You should never allow a patient with hip-disease to walk.*

<sup>1</sup> We will describe later on double hip-disease, coxitis with Pott's disease, etc.

Patients must not be allowed to walk save only those of the working class who are not able to be carried each day out of doors, and to whom, being kept at rest would mean being condemned to moulder away in some hovel. In these cases, then, you would make a plaster apparatus down to the malleoli, and allow walking, but with crutches and a thick sole on the sound foot, in order that the foot of the affected side does not touch the ground.



Fig. 366.—1st case. Left hip-disease at the outset, without vicious attitude.

For all other children rest in the recumbent position is infinitely better than walking, and you will order rest if you have entire liberty of action. However, if the parents *insist* on their child being allowed to walk, you may consent, provided he wears a plaster. In many countries nearly all practitioners readily agree to this and treat their patients in this way. But you would not consent to it *without having freed your conscience* and informed the parents that in walking, whatever apparatus be chosen, with or without some arrangement for the so-called taking the weight off the trunk,<sup>1</sup> with or without crutches, whether they put the feet to the ground or not, there is much less chance

of causing cases of recent hip-disease to abort (those of the

<sup>1</sup> There are surgeons who, after having vaunted, for twenty years, such "appareils de décharge" approve of them no longer, having found fewer advantages than inconveniences in them, and actually prefer the "appareils de pression" of the two articular surfaces, that is, they make a simple plaster apparatus down to the knee, with which their hip cases walk on the sole of the foot, without even a high heel or crutches!



first variety) and of obtaining the *restitutio ad integrum*. If walking is permitted, one will very often see produced an aggravation of the lesions and the formation of an abscess. And if it should be one of the other varieties (second, third, fourth, or fifth), you will warn the parents that with walking, or, rather, in spite of walking, one succeeds nearly always in curing the patient, it is true, but by taking much longer time and leaving the limb much more shortened, because, with the weight of the trunk upon the softened extremities of the bones—a weight which no apparatus could do away with—and with the shaking and knocks inevitable in walking, the lesions will progress more and will leave an erosion and a loss of substance of the head of the femur and of the acetabulum more extensive than if the child had not walked. Thus you leave the question of walking in the hands of the parents, and whatever is the result, it will be that which they deserve. When you have to deal with reasonable parents, the child should be put to rest in the recumbent position.

The prescription of rest, however, is not sufficient. For *hospital children* and those of the *working classes* you make a large plaster reaching from the umbilicus to the toes; your objective should be to cure rapidly and permanently without troubling here about movements.<sup>1</sup>

For *private patients*, well cared for by their parents, do not put on a plaster; keep them, **in mild cases**, at rest on the frame with continuous extension, which will efface the ugly deformity which may exist and will give a greater chance of preserving mobility than the plaster.<sup>2</sup>

*The functional result to look for in the first variety.*—Thus, then, contrary to what holds good in Pott's disease, where we

<sup>1</sup> Because, in these children . . . "leave well alone."

<sup>2</sup> Would you do more and better? Would you make certain and hasten the cure? Well! make in all these cases a series of modifying interarticular injections as for a white swelling of the knee. It is a little more difficult in the hip than the knee. Nevertheless, earnest practitioners may succeed by means of the technique given by us further on, p. 380.

ought always to look for ankylosis of the affected bones (and where, consequently, plaster is always indicated) one ought, in the first variety of hip-disease, to look for the preservation of the articular movements, when that is feasible without endangering the cure—that is to say, in children who are well looked after.



Fig. 367.—Left coxitis, 2nd variety. Extreme abduction. Coxalgia extremely painful. The child has been anæsthetised; the redressment is about to be carried out.

*After Care.*—The treatment once commenced, it will be sufficient for you to see the patient again once or twice a month. You continue the treatment until the cure, which you may consider accomplished in from six to eight months after the disappearance of all pain, spontaneous or on pressure. Then

you get the child up, helping him, in the first exercises in walking, by means of a removable apparatus in celluloid (see p. 473, *Convalescence*).

## 2nd VARIETY.—HIP-DISEASE WITH DEFORMITY

**Hip-disease fully developed, accompanied with a marked deformity (of more than  $20^\circ$ ).**

Deformity occurs *either in abduction* (fig. 352), **at the commencement, with lengthening of the limb** and some pain; **or, later, in adduction** (fig. 368), **with shortening of the limb**, and, most often, without pain.

Generally, adduction does not occur until after a period of abduction; this change of attitude may occur all at once, in one day, with some suffering; but, as a rule, it is produced little by little, in several days, and without suffering. In these cases of deformity, there is one treatment only to be adopted, in private or in hospital: *the straightening of the hip-joint*—in several stages, if the parent object to anæsthesia—but better, with chloroform, at one or two sittings, each stage being followed by the application of a large plaster.<sup>1</sup>

*The Functional Result to be sought for in this Second Variety.*—In the diseased hips of the second variety, and in the three following varieties, one abandons the idea of preserving movement. One should have for one's objective the cure with a stiff hip-joint, but in a good position.

*After Treatment*, when the deformity is corrected.



Fig. 368.—Simple adduction (right hip-disease).

<sup>1</sup> For the second variety, as for the first, I advise you to make intra-articular modifying injections before or after the straightening, but more often before (see p. 380 about these injections).



The apparatus is changed about every four months. The removal of the plaster and the toilet of the child are performed in the way described for Pott's disease. Take the opportunity, when making the change, to examine the state of the diseased hip-joint.



Fig. 369.—The abscess is indicated by a swelling limited to the outer region of the thigh, at a level with the upper third.

**Duration of rest** (in the plaster). Continue until all pain has disappeared, and even six or ten months from that time.

**The child is then got up**, but with an apparatus (plaster or celluloid) which he will wear day and night until he no longer has any tendency to a new deformity. But, such tendency still generally exists for one and a half or two years after regaining his feet, that is, after the cure of the tuberculous mischief.

But you must know that, in the second variety, very commonly (from the twelfth to the twentieth month) an articular or peri-articular abscess may make its appearance: the abscess of hip-disease.

### 3rd VARIETY.—HIP-DISEASE WITH ABSCESS<sup>1</sup>

**Abscess** is produced in about half of the cases taken *en bloc*. It is more generally found in children who walk about and whose general condition is indifferent. The abscess does

<sup>1</sup> See fig. 369 and 370, also fig. 355 and 358, p. 363 and 364.

not show itself for maybe a year or two after the appreciable clinical commencement of the disease. It is announced nearly always some weeks or several months before its appearance, by pains and night crying, occasionally by a slight evening rise of temperature of  $99.5^{\circ}$  to  $100.5^{\circ}$ . Very often it is not announced by anything appreciable, and you should now and then look systematically for it, by careful palpation of the entire region of the hip-joint. You should make this complete



Fig. 370.—Method of searching for an abscess; successive palpation of all the points with the two index fingers placed thus.

examination and systematic search for an abscess every month or two months, for example, in patients not plastered; you will make it every three or four months in those who are, that is, simply at each change of the apparatus; this suffices well in practice, for an abscess always takes, at a minimum, several months to form, and, reckoning from that moment, five or six months, as a minimum, before there is a risk of its opening.

The abscess may be produced in front or behind (in the buttock), outside or inside of the region, upwards, towards the crural arch, or downwards, towards the middle of the thigh, but especially at the upper third of it, in the antero-external region.

Finally, let us mention that an abscess is generally the index of a serious form of hip-disease, in the sense that we must expect a shortening of about 3 cm. consequent upon the necrosis of the head of the femur and of the acetabulum, which is produced in nearly every case of suppurated coxitis (see p. 363 and 364). The softening and necrosis of the bones are less in the varieties without abscess. Not always, however; there are some dry forms of hip-disease, to which we will return (see p. 378), which bring about in the long run a necrosis as marked as in cases of hip-disease with abscess (see fig. 359); more than that, these dry caries may continue six, eight or ten years, while hip-disease with abscess may be cured very quickly, in a few months from the day it reveals itself, provided that you treat it with punctures and injections. This is why it would be preferable for the patient to have an abscess, which hastens the cure. In some of those cases of old dry caries we often wish that an accessible abscess would show itself.

It is true that **formerly suppuration in the hip-joint** was **much more serious** than a dry coxitis—because, then, one opened the abscesses and, by this open door, by this fistula, there penetrated into the tuberculous focus septic germs, carried in from without, which engendered fever, infection, visceral degeneration (of liver, kidneys, lungs), too frequently terminating, sooner or later, in death.

Therefore, for abscess in hip-disease, as well as for that in Pott's disease, the first word as to treatment should be not to open an abscess, nor allow it to open itself. The second, to treat it by punctures and injections.

We may summarise in a few words the line to follow in the presence of an abscess.



**You must not interfere with it until it is easily accessible.**

**It is better to interfere with it than to abstain from doing so, if it is accessible,** which is nearly always the case.

**It is a pressing duty, if the abscess is threatening the skin.**

By interfering with it I mean, I repeat it, puncturing it, and injecting it afterwards.

#### **4th VARIETY.—HIP-DISEASE WITH FISTULA**

If every surgeon treating an abscess in hip-disease did his duty (in the way we prescribe) there would be no more fistulæ in hip-disease. But there always will be, because . . . *errare humanum est*.

What is to be done when a fistula already exists? We ought to repeat here what we have said of fistulæ in general, and of those in Pott's disease (Chap. III. and Chap. V.). We have seen the way to distinguish a non-infected fistula from an infected one, that is, one with a *secondary* septic infection added to the tuberculous focus—pure at the commencement. The discrimination of the two varieties of fistula is of much importance in prognosis and treatment.

##### **(a) Non-infected Fistulæ**

Here no ground is lost as yet, but it is necessary to hasten the closure of the fistula, because, in the long run, it will almost certainly end by becoming infected.

One will make injections after the manner described on p. 168, through an opening made in the plaster.

##### **(b) Infected Fistulæ**

In the **infected** fistulæ, the treatment is summarised in four words: antiseptis, fresh air, overfeeding, and patience.

Keep to simple antiseptic dressings as long as there is no fever (the absence of fever proves that the pus is discharging well).

When fever supervenes and persists for several days or several weeks, one must interfere, for fever is the enemy. Its cause must be retention of pus, and it is necessary to find out where this retention is, and drain at one or several points, but drain **only**, with no other desire than to bring about a fall of the temperature (fig. 174).



Fig. 371.—Edouard R., England (Hospital Rothschild), admitted in July, 1900, with seven infected fistulae and an evening temperature of  $104^{\circ}$ . After two and a half years of persevering treatment, closure of all the fistulae (without surgical operation), then redressment. Actually now, January, 1909, he walks very satisfactorily.

If the fever is overcome in this way by drainage, do not concern yourself about any operation with pretensions to radical cure. Above all, do not make a resection which "would carry off everything" . . . yes, even the patient himself; these great resections merely revive the infection already existing, and consequently do more harm than good.

#### Resection in Hip-Disease

So-called complete resection in hip-disease is a bad operation; it cannot cure the tuberculous fistula; indeed, it very often aggravates it. More than that, it mutilates the patient—a patient who has been resected preserves (when he is cured?) a limb much less satisfactory than if he had been treated without resection.

It is **not** necessary to **perform incomplete resection except to perfect drainage**: that is the only indication and the only use of resection in hip-disease. Believe me, the indica-

tion for this operation will perhaps never present itself to you, for, personally, I do not find it necessary to perform

even one a year (on an average) out of several hundreds of cases of hip-joint disease which I have under treatment.

Take particular notice of this indication. In certain cases the fever persists in spite of all the drainage secured; if the fever is not due to a general cause, it is due to infected pus being retained at the bottom of the acetabulum or in the pelvis above the perforated acetabulum, being kept there by the presence of the head of the femur, which it may be necessary for us to remove entirely or partially.

You will perform resection, not with the great idea of doing away instantly with all the lesions—that is impossible—but with the more modest intention of doing away with the retention of pus and removing the infected sequestra which may be, of themselves, a cause of fever.

**At what moment would you perform resection?**

In such a case, one must know when to interfere—not too soon, but not too late.

Not too soon, that is, not before having tried all the other means to make the temperature fall: peri-articular drainage, and drainage below the crural arch, and, if that will not suffice, opening of the articulation, *i.e.* simple arthrotomy. For resection ought to remain an operation of necessity; it must not be resorted to unless one is morally certain the temperature will not fall without it.

It is necessary, however, *not to intervene too late*. I will explain myself.

Fever is a danger vital to the patient, a danger soon fatal if it rises to from  $102^{\circ}$  to  $104^{\circ}$ , but less imminent if it oscillate about  $100^{\circ}$ . In both these cases it leads to a visceral degeneration (albuminuria, fatty liver, enlargement of the spleen, etc.). If one interferes only when these have already advanced to a marked degree, these secondary visceral degenerations following septic absorption, one would not be able to “save” the patient, and the visceral lesions would from that time progress of their own accord.



It is better not to wait until there is albumen in the urine (the urine must be analysed every two or three days). Nevertheless, when there is only a trace of albumen, there is still time to interfere, but you must be quick.

It remains always well understood that the cause of the fever is to be found in the hip-joint and not in the visceral complication, in which case an operation unavoidably incomplete would merely stimulate the visceral affection and the fever itself. In the course of the operation upon these infected patients you should use antiseptics but sparingly, on account of the kidneys. You prescribe a milk diet after the operation (and even before) to the same end.

If you find that the subject is already profoundly infected, with a slight tinge of jaundice, a notable quantity of albumen in the urine, and a liver projecting beyond the costal margin, that is, with all the signs of an infection which has already spread through the entire organism—in such a case, it is too late to operate; you would not cure your patient; you would have, in operating on him, every chance of sensibly hastening his death. Leave him to die in peace.

This leads me to repeat to you in the form of conclusion: A fistula in hip-joint disease is infinitely more difficult to cure than to prevent.

To prevent it, do not open abscesses and do not allow them to open spontaneously; that is all.

Recall our aphorism: “**To open tuberculous abscesses (or to allow them to open) is to open a door through which death will too often enter.**”

#### 5th VARIETY.—HIP-JOINT CASES WHICH CONTINUE INDEFINITELY

I wish to speak here of those **old hip cases invested with the name of rheumatism**, and which never come to an end! Coxitis without abscess, with pains occurring from time to time and due to a dry caries.

The patients can get about a little, they have almost returned to their accustomed life, but without ceasing to suffer unmistakably in the hip, yet they find, from time to time, that their sufferings become so acute as to oblige them to give up walking and return to complete rest for several days or several weeks.

What is one to do with these cases of dry coxitis, which linger on for six years, eight years, ten years, twelve years? One ought to long for the formation of an abscess, as we have mentioned on p. 374.

One could puncture an abscess, and one would be rid of it with a few months of treatment; whilst without an abscess the disease may be protracted for years. But an abscess will not develop! (This is not so absolute, however—it may do so when we are no longer expecting it.)

Here are the three alternatives between which you must choose.

Either make injections, or wait, or resect.

1st. **Injections?** Yes, but it is particularly difficult to reach all the points of a hip-joint affected for so long a time, where the joint surfaces are adherent, partially or entirely.

Try to, however. I have cured some such patients.

If the injections cannot give you, in this case, a rapid cure, they will not be without some advantage.

2nd. **Wait?** Yes; if the injections have not succeeded, wait—placing the patient at rest, at least at relative rest, not allowing any walking without a plaster or celluloid apparatus, making nocturnal extension, etc., then resuming the injections once or twice a year.

3rd. **Resect?** There are no indications sufficiently pressing to lead to this operation, which allows, by whoever it may be done, so many chances of leaving a fistula, consequently an aggravation instead of an amelioration of the patient's condition. A fistula! Think now, if it became infected, it might lead to death, whilst the actual pain of the disease does not, after all,

prevent the patient leading an almost normal existence. Resection can be contemplated only if you are a very capable surgeon, full of confidence, and if the patient, quite aware as to what may happen, nevertheless begs you to bring the matter to an end.

And even then, make him wait, induce him to reflect upon it for six months or a year longer, before you carry it out. If he continue to insist, you may operate on him, but I think this obligation will not be put upon you once in twenty times. If you resect, endeavour to obtain, by every means, union by first intention.

## THE METHOD OF MAKING INJECTIONS IN HIP-DISEASE

### I.—The Value of the Injections

Before going further, I will explain myself as to this. When you have read in the following chapter (Treatment of White Swellings) that injections are the regular treatment for those arthritides (where they give the same good results as in cold abscesses) you will ask why I have not immediately recommended this means as the invariable treatment in coxitis, which is only, in fact, a white swelling of the coxo-femoral joint.

Simply because this method is more difficult of application to the hip than to the other joints. The articulation does not lend itself to it, anatomically, as the knee, for example, does. It is more deeply placed; the cavity is less accessible to the needle. I do not speak only of the space between the articular surfaces which are fitted together too closely for the needle to be able to penetrate the interline easily, but also of the synovial culs-de-sac, where it is difficult to introduce the injection with certainty.

The difficulty is especially great in rather old cases of hip-disease where the cavity is obliterated by adhesions, or, at least, traversed by septa.

That is why injections are not yet admitted into everyday treatment in hip-joint disease. But how we ought to regret it, and what great benefit they would bring with them! I do not hesitate to say that it is only with the injections that



we are able to alter the prognosis of coxitis, still so grave from the orthopædic point of view, by any of the other treatments in vogue.

And if hip-disease no longer kills—or, at least, very rarely—since practitioners no longer open the abscesses, it still leaves far too much shortening and lameness, in spite of the best fitting apparatus, in spite of correction of the deformity. This is due to the fact that tuberculosis rarefies, softens the articular surfaces of the hip-joint, the head of the femur and the roof of the acetabulum, and consequently paves the way to the destruction and shortening which supervene, sooner or later, after one or several years. See in the figures on p. 366 the extent to which this wasting and destruction of osseous tissue goes.

And this is not infrequently so—it is so in more than three-quarters of the cases taken *en bloc*: first, in all those accompanied with abscess, which represent already half of the cases of hip-disease; and, second, in the case of nearly all dry forms which continue beyond one or two years. It is what occurs nowadays, in spite of rest, immobilisation, general treatment, etc.

If practitioners are not willing to do more, they must be resigned to see more than three-quarters of their cases of hip-disease doomed to a permanent shortening of from 3 to 4 cm. on an average; and you know that such a shortening cannot exist without an appreciable lameness.

What must be done is to seek for and find the means of preventing this, or, better still, of preventing the softening and wasting produced by the tuberculous fungus; the means of destroying it before it has “eaten away” the head of the femur and the roof of the acetabulum. Does **the means of destroying the fungus** or of restraining its development exist? Yes, there is one means, but only one; it is to carry a *modifying liquid* right up to it. **The proof has been confirmed** in the granulations of cold abscesses and other white swellings, which do not differ obviously from the granulations of hip-disease.

Seeing that in the disease at its commencement (autopsies of cases of early hip-disease prove it) the lesions are always localised in the synovial membrane and on the articular surface of the bones, we should be able by early intra-articular injection to attack the granulations before they have destroyed the bone.

Here, by the way, is a commentary on tuberculosis of the hip-joint, which is very instructive in this respect :

Madeleine, J., seven years old (from Paris), sent by my very distinguished colleague, Dr. Cuneo, arriving at Berck in Sep-

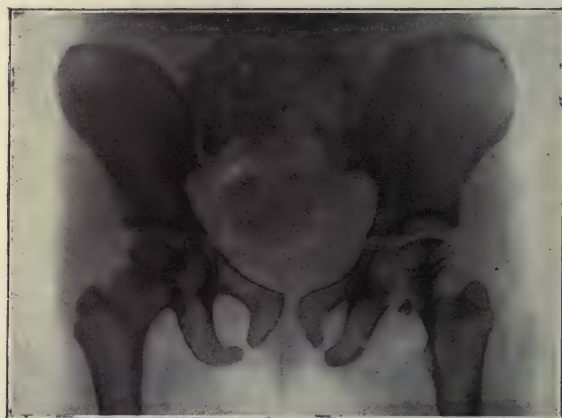


Fig. 372.—Madeleine, J. Radiogram on arrival.

tember, 1903. The radiogram (fig. 372) shows that the tuberculosis has destroyed a good third of the neck of the femur and that there is a sequestrum at that point. This sequestrum it had been proposed to remove by a surgeon who affirmed the impossibility of cure without operation, but the parents refused their consent.

As for me, I did not believe in the necessity of a resection for the cure of the child ; but I feared complete destruction of the neck after a short time by the progress of the tuberculosis, which appeared to be very virulent ; it was excessively painful,

which led me to propose modifying injections, to which the family, unfortunately, objected. Half a year passed; the child was not better. I insisted again with the parents, telling them that, if they refused, we should very probably see in a few months the neck destroyed entirely, the head separated from the diaphysis, and that grave and irremediable infirmity would result. M. Cuneo also insisted and succeeded this time in convincing the parents.



Fig. 373.—The same patient after six months. Radiogram taken at the time the injections were commenced.

Our fears were only too deeply realised. A radiogram taken at the time we commenced the injections (fig. 373) showed plainly that the tuberculosis had destroyed nearly a third of the neck since the first examination and the first radiogram, and that, in spite of rest, in spite of the plaster, and the air of Berck.

I made a series of injections of camphorated naphthol after the manner described on p. 160. I softened the granulations and obtained an appreciable collection of pus at the sixth injection. From that time I made punctures and injections to the extent of



ten punctures and ten injections according to my usual technique for the treatment of tuberculous abscesses (see Chap. III.).

A strange thing, which showed that we had reached the affected part of the bone, was that through the puncture needle, small osseous granules, *débris* of sequestra easily recognisable, repeatedly passed out. After this series of injections, which lasted seven weeks, compression was made for three months. A year later, we took a new radiogram (fig. 374); not only had the destruction of the neck not progressed, but the neck,



Fig. 374.—The same patient a year after the injections. No other trace of the disease remains except a loss of osseous substance on a level with the superior and internal angle of the neck. Complete cure with all the movements intact.

on the contrary, was slightly repaired and the cavity which had appeared was partly filled up. More than that, the sequestrum had disappeared. The patient was cured. The neck has ever since then become stronger. We saw the child three years later; she had become perfectly cured without any shortening, without functional damage. Think of the infirmity she would have had to live through if we had not made the injections, or if we had waited longer!

This proves, and we have plenty of other cases to the point which also prove (fig. 375, 376), that our injections are able to

destroy the granulations and to preserve the bones of the hip-joint from rarefaction and, eventually, destruction.

You see, now, why I advise you to make intra-articular in-



Fig. 375.—Germaine, G., five years of age; left hip-disease before injection. The joint was threatened with complete and early destruction.

jections at the outset, in all cases of hip-disease, as one constantly does for white swelling of the knee. And the treatment will

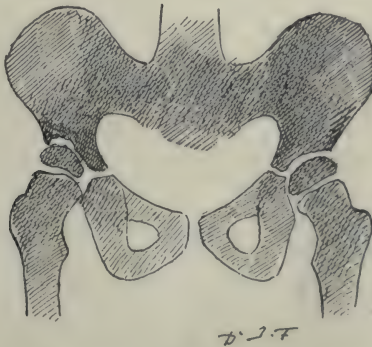


Fig. 376.—The same, eighteen months after injection. One can see that, thanks to the injections, wasting has not progressed. The tuberculosis has been averted.

be even more necessary in the hip-joint, where the bones, as experience shows, resist the destructive action of the tuberculosis infinitely less well than those of the knee.

## II.—Indications for Early Intra-articular Injections

Because we have spoken of making them in *all* cases of hip-disease, we do not wish to say that there are not cases of hip-disease essentially benign, where, the lesions having been only synovial and the bones hardly touched by the tuberculosis, there will certainly ensue an important osseous destruction if injection is not carried out.

No, there are some fortunate exceptions already pointed out; but how are we to know which are the cases which may be cured in this way without subsequent destruction? There is no absolute rule to guide us.

There are probably cases of hip-disease which arise without spontaneous pain or deformity, and in which there is not, as shown by the X-rays, any breaking down nor even appreciable rarefaction of the bones, cases of hip-disease which have been, on the other hand, taken care of from the outset. Yes, without doubt; but remember, however, that there is nothing certain from this point of view, that nothing can give us precise assurance that, while we are keeping back our injections, the tuberculous process is not secretly and silently rarefying and softening the extremities of the bones.

Consequently, even in these cases, and because of the too numerous uncertainties which we have against us, we must **make injections**: that is, speaking generally, **in all cases**.

## III.—When must the Injections be Made?

We say, at the very **beginning**: as soon as the diagnosis is established.

**To wait until there is an abscess**, or to interfere only when the coxitis has lasted one or two years, **is a mistake**, because then it is too late.

In fact, in all hip-disease lasting for one or two years the rarefaction of the bones is already too marked, nearly always, for you to be able to save them from wasting. When the hip-



disease appears before the abscess, with already a noticeable deformity of more than  $20^{\circ}$ , or with severe pains, it may mean we are too late, not always, nor even frequently, but in some cases.

The principle is to make injections before the bones are—I do not say destroyed—but simply softened.

Does this mean that no injections must be made in cases of hip-disease which are already old? No, they must be made because, with injections, if one is not able completely to prevent destruction (the bone being already too much softened and



Fig. 377.—Radiogram during life after the introduction of the needle; the point is in the interspace. This proves that one can penetrate there, but it is uncertain and difficult.

rarefied), one may still limit it somewhat, since it takes three, four, and five years, and more, to arrive at the full extent of the mischief. (In four cases of old hip-disease of two and three years, standing, I have been able to save, almost entirely, the osseous extremities which, as shown in the radiograms, had, on the arrival of the patient, seemed doomed to complete destruction).

#### IV.—The Technique of Intra-articular Injections of the Hip-Joint

First, you will carry out the treatment in the same way as for white swellings. You will find in the following chapter (p. 394) a list of the instruments required, the liquids, the

number of injections, their frequency, and you ought to *read the entire chapter before making injections into the hip-joint.*

#### V.—The Points of Access to the Hip-Joint

To penetrate into the cavity, the point of election is found *in front.*

Examine a sound hip-joint; you will be able to feel below the crural arch, between the sartorius and the artery, the head

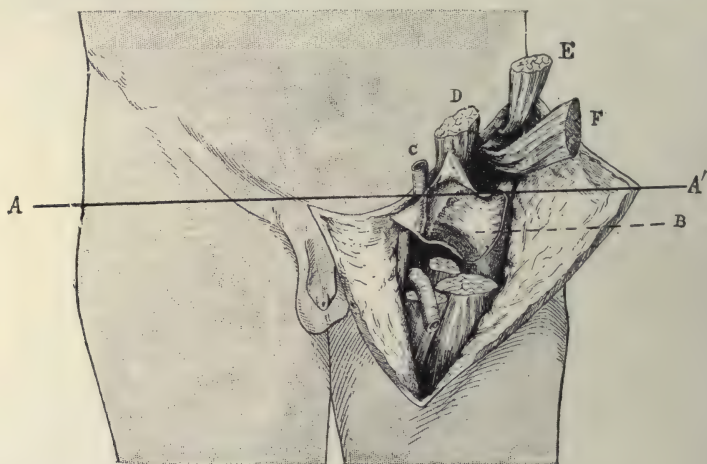


Fig. 378.—Dissection of the inguinal region to show the **accessible zone** of the synovial cavity; this zone **extends over the whole anterior surface of the neck.** AA', horizontal line passing through the pubic spine; B, anterior surface of the neck; C, femoral artery; D, psoas; E, sartorius; F, rectus (B is the point of election for puncture).

of the femur rolling under your finger when you impart movements of rotation to the knee (see fig. 377 and following figures).

In front, the cartilaginous part of the head is *directly* felt (that is to say, is outside the acetabulum) to a depth of  $1\frac{1}{2}$  cm. in a child,  $2\frac{1}{2}$  cm. in an adult, and we must allow for, in addition, the cul-de-sac which forms above this point the synovial sac. This zone is as broad as it is deep. We have therefore an area there quite sufficient for giving the injections.

To reach the cavity in this zone, we have only to pass through

the skin and the thin muscular lamina of the psoas and iliacus. It is easy to avoid the vessels (artery and vein) which are well out of the way on the inner side, as shown in fig. 378.

As to the anterior crural nerve, it is nearer. Still, it can be avoided quite as easily, because it is in close relation with the



Fig. 379.—Radiogram during life in one of our cases of hip-disease, after the injection of iodoformed oil into the synovial cavity; one can distinguish the shadow of the capsule distended with the liquid. This is the proof that one has penetrated into the joint cavity.

artery, and, besides, pricking the nerve would not have very serious consequences.

But it is necessary to enter into some details.

We have made more than one hundred experiments on the cadaver (injections, followed by control dissections) and numerous radiograms *during life* of our cases of hip-disease, after injections with iodoform (see fig. 379), to establish in a definite way the



technique of the injections. Here are the practical conclusions drawn from our inquiries.

You ought not to make injections into the articular interline—which is not impossible (see fig. 377) although it is difficult to reach. Neither must you make them on a level with the



Fig. 379a.—Diagram drawn from nature of a dissection, after an injection with methylene blue of the two hip-joints. On the right side is seen the capsule distended with liquid, between the artery and the psoas and iliacus. On the left, the capsule has been incised.

cartilaginous part of the head, because the capsule, being at this level in close contact with the bone, the liquid would only penetrate into the interstice with great difficulty. **You should make the injections into the inferior synovial cul-de-sac even with the anterior surface of the neck;**

this cul-de-sac possesses a certain laxity which renders the penetration of the liquid relatively easy.

Here are the points fixed upon. In a child of ten years, you puncture at a point indicated by a small cross in fig. 381, at 1 cm. below the horizontal line passing through the pubic spine and at  $1\frac{1}{2}$  cm. outside the femoral artery (which can be felt pulsating). In an adult allow respectively  $1\frac{1}{2}$  and 2 cm. (fig. 380 and 381).

Puncture directly from before back. The needle should be pushed in to a depth of from 3 to 4 cm. in a child, and from

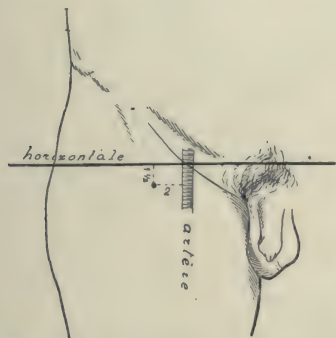


Fig. 380.—In an adult, puncture  $1\frac{1}{2}$  cm. below the horizontal line passing through the pubic spine, and at 2 cm. outside the artery.



Fig. 381.—In a child of from 9 to 10 years of age, at 1 cm. below the horizontal line and at  $1\frac{1}{2}$  cm. outside the artery.

5 to 6 cm. in an adult of medium build. In a word, push it in until it is stopped by an osseous plane (the anterior surface of the neck) the resistance of which is characteristic. You will always be stopped by the bone, if you puncture at the right place.

One may succeed by placing the thigh in the extended position. But the penetration of the liquid is facilitated considerably, as M. Farabeuf has pointed out, by placing the limb in the position of flexion at from  $25^\circ$  to  $30^\circ$ , with abduction and external rotation of from  $15^\circ$  to  $20^\circ$  (fig. 383).

You understand then, that by this slight flexion of the thigh, always possible at the outset of hip-disease, the anterior

part of the capsule relaxes (as the fingers of a glove are relaxed by flexion of the hand), detaches itself from the bone and comes of



Fig. 382.—Fixed points traced with dermographic chalk; the thigh extended, puncture and penetrate until you feel the bone.

its own accord under the point of the needle, which penetrates it easily (see fig. 384 and 385).

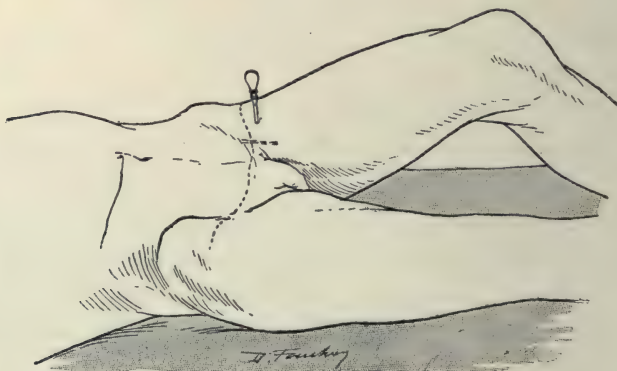


Fig. 383.—The femur is afterwards put in flexion at about  $30^{\circ}$ ; while this movement is made, see that the point of the trocar does not leave its contact with the bone.

The injection being pushed home, place a tampon over the puncture and lay the thigh gently down. Then apply a light, compressive dressing.



**VI.—Conclusion**

We will now give the schema of treatment which you ought to follow in all cases of recent hip-disease.

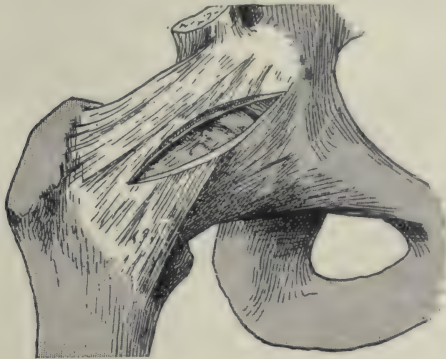


Fig. 384.—The incision allows one to see that, in the position of extension of the thigh, the capsule is flattened over the head and neck.

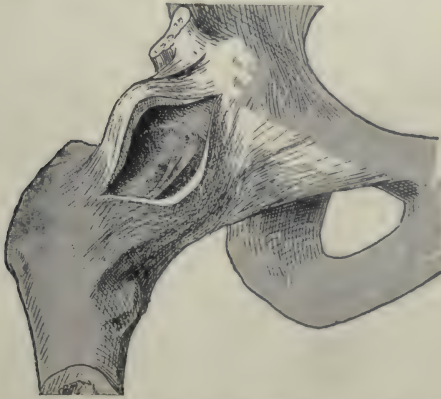


Fig. 385.—In flexing the thigh, the margins of the incision gape widely, allowing the space which exists between the capsule and the bone to be seen.

The diagnosis being established, you place your patient at rest, in continuous extension or in a plaster, according as the case is that of a private or a hospital patient.

If you employ the plaster apparatus, construct it in bivalve (fig. 386) in such a way as to be able to remove it easily at each injection, and to give to the thigh, each time, the slight flexion desired (fig. 383).

You commence the injections after two or three days' rest.

You inject, as we have said, the same fluids, in the same doses and at the same intervals as if you were treating a white swelling of the knee, or an ordinary cold abscess (see Chap.



Fig. 386.—Bivalve plaster held together by bandages or by hooks and eyes (see p. 346).

III.). Use a needle (No. 2) a *biseau court*, like the needle used for the injection of cocaine in the spine, and inject oil, creosote and iodoform (4 to 10 grammes) rather than naphthol, camphor and glycerine.

The nine or ten necessary injections take you two months, after which, for three months, you make pressure with cotton wool over the articular region (always combined with continuous extension or a plaster).

This period having passed, discontinue the plaster, but you

must wait four or five months before allowing the patient to get about. Then he is cured.<sup>1</sup>

So that the cure will be obtained in ten months from the commencement of the treatment (ten to twelve months), instead of the three or four years [?] required by the ordinary treatment without injections.

**With the injections, the duration of hip-joint disease will thus be reduced by two-thirds ; but, above all, cure without shortening and without lameness—complete cure—will be the rule, while with all other treatments such a result would be quite exceptional.**

Thus the history of the treatment might be written in three lines—

*1st period*, that when *one used to open the abscess* : the patients died of hip-joint disease.

*2nd period*, that when *one punctured the abscess* : the result was the cure of the hip-disease, but at the price of some infirmity.

*3rd period*, that of **early intra-articular injections** : the hip-disease is cured, cured quickly, without lameness and without defect of any kind (see *Journal des Practiciens*, March 14th, 1908 ; *Traitement de la Coxalgie*, conférence faite à l'hôpital Beaujon [service du professeur Robin], par F. Calot).

#### 6th VARIETY.—HIP-JOINT CASES "CURED," BUT WITH A DEFECT (SHORTENING, ANKYLOSIS, LUXATION)

I wish to speak here of those cases of hip-joint disease cured, or apparently cured for one or several years, which come to you, or come back to you, for some functional defect (fig. 387 and 389).

The parents complain that the child is more or less lame,

<sup>1</sup> If this is not so, that is, if pain continues four months after the injections are stopped, which may sometimes happen here as in the other cases of white swellings, you would make a second series of injections. (Consult the note on p. 498.)



that the limb is shortened and is still becoming shorter, that the back is deformed, at the same time that the loins are becoming hollow ; or simply that the hip is stiff, which causes a difficulty in sitting down and in putting on the shoes.

They come to ask you if it is possible to efface these functional defects or, at least, to prevent them becoming worse.

Your reply should be prompted by the two following principles :—

1st. If there is **simply stiffness of the hip, nothing must be done.**

2nd. If there is lameness and shortening, or dorsal deformity, one can and one ought to **do away with as much of this lameness and shortening as is caused by the deformity of the hip-joint.**

The deformity removed, do not look for mobility, but endeavour to produce an ankylosis in a good position.

I will explain myself by imposing two rules, which are—

1st rule. You will not interfere in order to “loosen” the hip-joint.

Fig. 387.—Vicious ankylosis ; flexion, adduction and internal rotation.



Indeed, it is either a question of Hip-disease without shortening—(see page 367, Hip-disease of the first variety)—and then you will not touch it, in virtue of the *primo non nocere* ; for not only would you have not more than one chance in ten of re-establishing the movements, but you would run too great a risk, in interfering, of **aggravating** the patient's condition.

Or it is a question of hip-disease with shortening—(see page 371, hip-disease of the second, third, fourth varieties)—and then it would be rendering a very poor service to the patient to do away with the stiffness of his hip-joint,

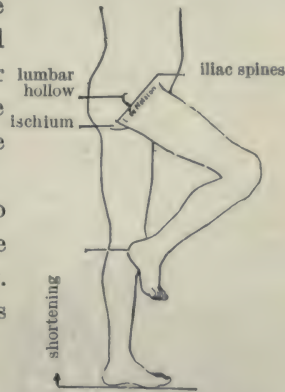
admitting that it were possible to succeed in doing so without danger to him.



Fig. 388.—Vicious ankylosis ; hollowing very marked.

As a matter of fact, these patients would not walk so well afterwards as before. It is to their interest to have the hip stiff ; this is so true that you must endeavour, in the case of patients with hip-disease in whom the joint is movable and there is marked lameness, to stiffen the joint in order to lessen the lameness, which can be done by wearing an immovable apparatus over a long period.

2nd rule. In lameness due to shortening, one will do away with the amount of it caused by the deformity. But what is this amount ? That is what we are going to determine.



#### A.—Shortening: its Causes or Factors

Very marked shortening is due to two principal factors—

1. *A deformity of the hip-joint.*
2. *Wearing away of the extremities of the diseased bones and atrophy of the bones of the whole limb.*

Against the first factor of shortening we can do much.

Against the second we can do nothing.<sup>1</sup> We can only hide it by causing a high-heeled boot to be worn.

Fig. 389.—In order to learn the exact functional shortening, one ought to efface the lumbar hollow and place the two iliac spines on the same level ; this, one does with the patient upright. The shortening is equal to the difference of level of the two heels.

<sup>1</sup> Except as preventive, by injections (see p. 380).

**Method of ascertaining the Total Shortening and the Amount of it due to the Deformity (fig. 389 to 396).**

In order to bring the foot of the affected leg as near as possible to the other, the patient hollows and deforms his back.



Fig. 390.—Here the shortening is measured with the patient lying down. To make the hollow disappear one has been obliged to give to the knee this marked degree of flexion. The total shortening is equal to the distance which separates the heels.

By this artifice, there will be less apparent shortening and perhaps less lameness ; but there will be in addition an unsightly dorsal deformity, which will not be any better than a degree more of lameness, especially in the case of a young girl.



Fig. 391.—An unusual deformity. The patient walks by supporting himself on his hands. The shortening equals the distance between the heels and even more, for one can see that the hollowing is not entirely done away with and that one would have, in order to obliterate it, to raise the knee still more.

To demonstrate the real shortening, the total shortening of the lower limb, you ought to begin by placing the back quite straight, and, in order to do so, you proceed to flex and carry inwards the affected thigh until the lumbar



hollow is effaced, until the loins are in touch with the table, and until the two iliac spines are at the same level (in the same perpendicular to the median axis of the body). This done, you bring the heel of the shortened limb against the sound calf, and

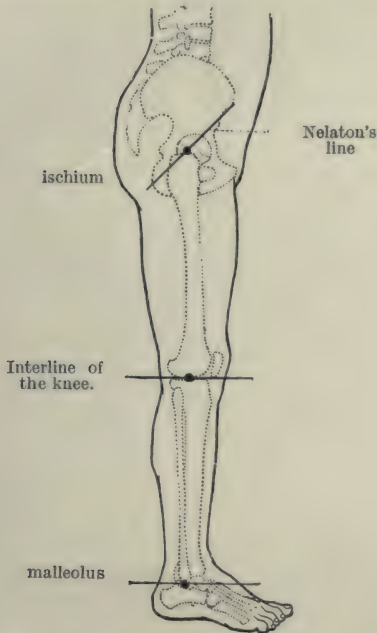


Fig. 392.—Measurement of the limb. Measure from the centre of Nelaton's line to the external margin of the sole of the foot (passing by way of the external malleolus).

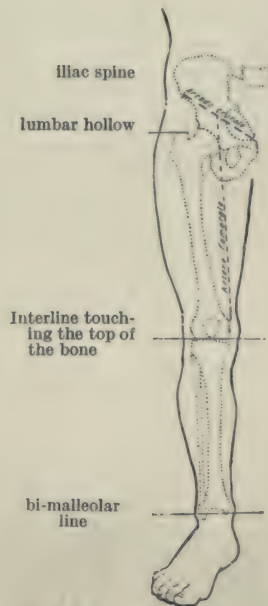


Fig. 393.—Measurement in front. (Compare the measurements obtained from the two limbs.)

measure from the point of contact to the ground (see fig. 390 and 391); this distance gives you the total shortening.<sup>1</sup>

<sup>1</sup> Measured thus, one sometimes calls the shortening functional, in contradistinction to the real shortening, which should be "the loss of substance" of the bones in their length; this distinction is an error, or, at least, demands an explanation; the functional shortening which is, for example, of 15 cm., is the real shortening, in the sense that the patient is *really as lame* as if he had a shortening of 15 cm., and if one does not remedy it, the patient will remain shortened all his life just as if he had *really* lost 15 cm. of the length of his limb.

**What is the share** of each of the two factors : **deformity** and **erosion** of the bones ?

It is easy to calculate.

Measure the length of the affected limb starting from the centre of Nelaton's line (I say from Nelaton's line and not from the upper border of the displaced trochanter); measure from that line down to the external border of the sole of the foot (fig. 392). Take the same measurement on the sound side, from Nelaton's line to the sole of the foot.

Compare the measurements of the two sides.

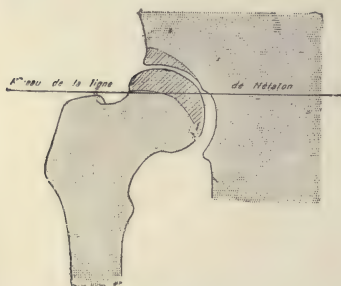


Fig. 394.

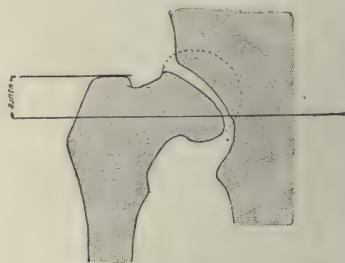


Fig. 395.

Fig. 394-395.—Method of measuring the share which is due to wasting of the bone; the wasting is equal to the distance which separates the two horizontals (trochanter and centre of Nelaton's line).

(a) **Erosion of the Bones.**—The difference between the two sides represents the share of the factor which embraces the wasting of the articular extremities and the atrophy of the skeleton of the whole limb. The erosion of the extremities alone is equal to the distance between the level of the upper border of the trochanter above and that of the centre of Nelaton's line (see fig. 394, 395).

(b) **Deformity.**—The *remainder* of the total shortening will be *the share of the deformity*.

Let us suppose the total shortening to be 15 cm. (which it frequently is) and that you have found, on measurement in the way we have mentioned, a difference of 3 cm. between the two

lower limbs. To the deformity will belong in this case, 15 cm. less 3, that is, 12 cm.

You will be able to promise the parents that you will do away with the 12 cm.—that is, four-fifths of the shortening—by your treatment.

Instead of actually 15 cm., you may tell them that the child will not have more than 3 cm. of shortening. And with only 3 cm. and with a hip-joint solidly fixed in good position, he will not be noticeably lame.



Fig. 396.—Estimation of erosion and atrophy in the length of the bones. The small horseshoe indicates the outline of the trochanter; the distance from the trochanter to Nelaton's line indicates the erosion. From the trochanter to the point of the patella (interline of the knee-joint) and from that interline to the external malleolus, is the measure of the length of the bones; compare with the sound side (the same fixed points).

#### The Reason for Interfering with Shortening

In what case would it be well to operate? At what moment? And how?

1st. We have said that much can be done for the deformity.

Is this a sufficient reason for submitting children to operation every time there is a deformity? *No. Unless the result is worth it.* So I advise you to do nothing, or to use only slight means—traction at night time, weights on the buttocks, etc. (see Congenital Luxation), in those cases where there is less than 4 or 5 cm. attributable to deformity, and if, moreover, this deformity is not increasing. To make sure of that, take exact measurements every three or six months.



On the other hand, it would be necessary to operate whenever at least 5 to 6 cm. are due to deformity, especially if this were increasing. And it happens very frequently that deformity is responsible for more than 5 or 6 and even 10 cm., and that it has a certain tendency to increase.

How to interfere, that is, **by what procedure?** That will depend on the degree of stiffness of the hip-joint and the variety of the ankylosis—*complete*, osseous; or *incomplete*, fibrous.

Direct examination, in revealing to you very distinct movements, enables you to make a diagnosis easily in the greater number of cases.

In doubtful cases, when you do not elicit distinct movement of the femur (after having fixed the pelvis), have recourse to X-rays, which will show you a continuity between the two bones. In default of radiography, administer a few drops of chloroform to make a rapid examination of the hip, and make certain whether there is movement or not. I can assure you that you will **nearly always** find, in true coxitis, **some movement**, even in the cases described “complete ankylosis of the hip-joint.”

#### B.—Ankylosis in Hip-Joint Disease

1st Case (frequent).—*Incomplete ankylosis.*

You have detected (with or without chloroform) very distinct movement; forcibly straighten the limb (without tenotomy if you are not a surgeon—with or without tenotomy if you are a surgeon).

2nd Case (rare).—*Complete ankylosis.*

There are **no distinct movements**, even under chloroform; do not persist, for, in persisting for 10 minutes, you might very often provoke them, because you may happen to separate the two welded articular extremities; you may cause also a great traumatism; do not do it; it would be better to consider it clinically as one of those cases of complete ankylosis, where there is not immediately, under chloroform, any appreciable movement.

In such cases, you will perform a supra-trochanteric **osteotomy (linear and subcutaneous)** or an intertrochanteric, to be further away from the old focus.

I do not wish to leave you ignorant of the fact that surgeons prefer osteotomy to simple straightening, even for incomplete ankylosis, because, say they, straightening, by disturbing the seat of the old tuberculous focus, is sure to predispose to a revival of the tuberculosis much more than osteotomy, which acts on a point far removed from the focus.

This objection has scarcely more than a theoretical value, especially if one does not carry out straightening until the tuberculosis is quite cured and the patient's general condition is good; it might be necessary to wait for one or two years for that. With straightening done at this moment, methodically, in two stages if you like, you would not run any more appreciable risks of re-awakening tuberculosis than by an osteotomy.

On the whole, forcible straightening remains, in every way, *more certainly benign than osteotomy*. With straightening you would have no operative complications, whilst you might perhaps have them with osteotomy, *e.g.* immediate infection of the small wound, or secondary infection of the periosteal hæmatoma caused by the operation.

For this reason I do not hesitate to recommend to you, practitioners and non-specialists, *straightening rather than osteotomy* for all cases where some movement persists.



Fig. 397.—Luxation.

### C.—Luxation of the Femur in Hip-Disease

We ought to speak here of *complete* luxations of the femur, which we must guard against confounding with a simple overriding of the head in the acetabulum which has become enlarged by erosion of the bone; overriding of this kind is as frequent as luxation is rare (fig. 397 and 471).

You will without doubt never see luxation at the *onset* of hip-disease (I have seen only one case in 17 years), and if you do see it, you will reduce it without chloroform by the manœuvres one carries out for congenital dislocation of the hip (see Chap. XIV.).

But you may occasionally see luxations **following** hip-disease in spite of the fact that complete dislocation, as the last stage of the disease, is exceptional, if the case has been looked after.

The diagnosis is easy to establish by radiography. In the absence of the X-rays, it may be difficult, except in the cases where, by palpation, one can distinctly feel the head of the femur in the buttock; but this is rare, because the surrounding tissues are fibrosed, and especially because the head of the femur, and even the neck, are more or less eroded or destroyed in these varieties of hip-disease.

To make the diagnosis in such cases, one may say that, as a general rule, if the trochanter is more than 4 cm. above Nelaton's line, there is a true luxation of the femur; below 4 cm. it is a question rather of a simple displacement of the head in the acetabulum, without the head having escaped from the enlarged cavity.

The **treatment** of pathological **luxations** of the femur is very **difficult**, but one is not completely helpless, far from it.

Without assuming that one can always correct the flexion and adduction which generally accompany dislocation, one may yet manage to correct them, either by reducing the head, if it is in good condition, which is rare, or, when the head



is destroyed, by implanting in the bottom of the acetabulum the upper extremity of the trochanter, which is always preserved (see p. 460).

## HIP-JOINT DISEASE ASSOCIATED WITH OTHER TUBERCULOSES

### (a) Double Hip-Joint Disease

*Double coxitis* is rare; fortunately so, because it is a very grave condition from an orthopædic point of view.

Double coxitis would not be so formidable if the patient would come at the very beginning, and be treated with early articular injections; but that is scarcely ever the case, and then the disease becomes aggravated rapidly; the bilaterality of the coxitis shows already that serious tuberculosis is at work, and serious tuberculosis does not remain at the first degree, neither on one nor the other side. It leads nearly always to deformity and to abscesses (*vide* second and third varieties).

And so we are "caught in a dilemma"; either the limbs cannot be sufficiently immobilised, in which case the deformity continues to progress, or they are placed in a large plaster, and a double ankylosis will result. But if ankylosis of *one hip only* does not prevent the patient walking, *bilateral* ankylosis is disastrous for walking, for sitting down or bending; in a word, for all the natural and physiological functions.

You see that, whatever is done, the orthopædic prognosis of double coxitis remains bad. Further, abscesses are of frequent occurrence; they are more grave, more liable to open than in single coxitis, and there is generally a persistent fistula, the evil consequences of which you know.

### What is the course to take?

When you chance to see a double coxitis at its onset, do not neglect to endeavour to stop the evolution of the tuberculosis by intra-articular injections.

As to **orthopædic treatment**: rest on a frame with continuous extension, well looked after. And, in a general way,

**prefer extension to a plaster**, because extension safeguards the mobility of the joint.

If rotation of the limb exists, outwards or inwards, meet it by the means shown in Chap. XIV., Congenital Luxation.

But extension is not always sufficient to prevent deformity being produced or to allay the very severe pain present. It will then be necessary to have recourse to the plaster for a while. But return to the extension as soon as possible.

What can be done for the deformity and stiffness already produced ?

If the deformity and stiffness are next to nothing, leave them alone.

If the deformity is very marked (more than  $30^\circ$ ) correct it gently, supporting with a plaster for two months, then go on with the continuous extension.

In the case of stiffness, if there exist at the same time a bad position, correct it (you know how) **without troubling to restore mobility.**

If both hip-joints are stiff but in a good position, do not touch them ; not that there are *no operations proposed* for mobilising the joints ; *there are too many !*

Do not perform any of these, because, with the best of them, you will run at least nine chances out of ten of doing more harm than good.



Fig. 398.—Coxitis and middle dorsal Pott's disease. The plaster is provided with a dorsal opening for compression of the gibbosity, and a pre-inguinal one for articular injections (or for the treatment of an abscess of the hip-joint).

(b) **Coxitis with Pott's Disease** (fig. 398)

The prognosis of good walking is here very poor, especially when the Pott's disease is situated in the lower part of the vertebral column : which one can understand, because the Pott's disease causing an ankylosis of the lumbar spine and the hip-disease leaving behind it so often a rigid hip, the child will be helpless with this double ankylosis.

*The treatment.*—One incloses in a single plaster the trunk and the whole of the lower limb.

If the large plaster is badly tolerated, take off the leg portion, and first endeavour especially to cure the Pott's disease by the ordinary treatment (see *Pott's disease*) ; for the hip-disease, make simply continuous extension (at the same time articular injections). Afterwards, when the Pott's disease has been cured, you will complete, if need be, the correction of the hip deformity.

(c) **Hip-Joint Disease with White Swelling of the Knee  
on the same side**

One treats the two diseases at the same time by making either extension, or a **large** bivalve plaster, and one endeavours to preserve some movement, as much as one can (early injections).

(d) **Hip-Joint Disease co-existing with Multiple Infections**

See Chap. XX., *Of Multiple Tuberculoses*.

II.—SECOND PART. *THE TREATMENT. TECHNIQUE*

The technique of the treatment of hip-disease comprises—

- 1st. The method of ensuring rest for the hip in the recumbent position, on a frame ;
- 2nd. Continuous extension ;
- 3rd. Plaster apparatus ;
- 4th. Straightening of the hip (simple redressment, with or without tenotomy or osteotomy) ;
- 5th. Treatment of abscesses in the hip-joint ;
- 6th. Drainage and resection of the hip-joint.



## (1) TREATMENT BY REST ON A FRAME

Does it not seem useless to devote a chapter upon the way to ensure rest for the hip-joint in the recumbent posture ?

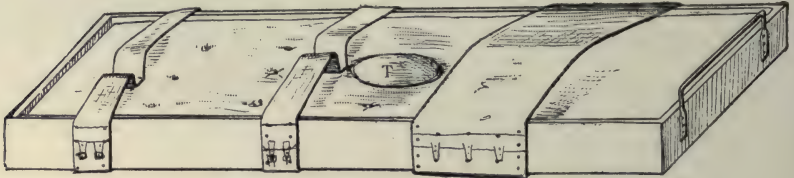


Fig. 399.—Our frame. An ordinary frame arranged with a median opening on a level with the seat : the opening is closed at ordinary times by a tampon (T).

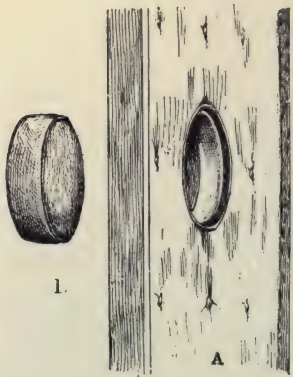
I do not think so.

It seems sufficient, does it not, to place the patient on a bed ?

Yes, doubtless, if the mattress is hard, even, and quite flat, and if the bed can be easily carried out of doors, to allow of the child passing the whole day in the open air.

It is more practicable to place the patient on an ordinary board well stuffed and movable ; or, better still, on a **wooden frame padded with horsehair**, provided on each side with stops for the straps destined to restrain the body ; the straps are fixed at one side and are buckled at the other (fig. 399).

Fig. 400.—Our frame. An utensil in place, seen from above. B. cushioned tampon which serves to take the place of the utensil when the latter is not required.



At the two extremities of the board or of the frame are two iron handles to carry the child into the open air, either into the garden on two chairs, or on a small carriage. The

cushioned board or frame may be made anywhere. Your cabinet-maker or upholsterer will make it for you.

These very simple means are excellent. But for the cases where absolutely perfect rest for the hip is necessary, I object to them, as they allow the child to alter his position and do

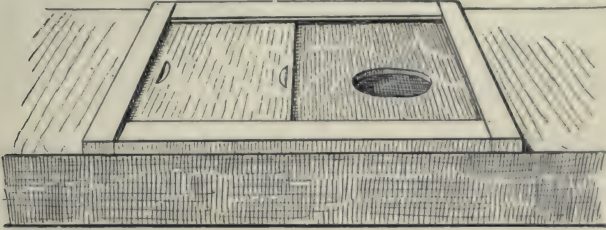


Fig. 401.—Our frame seen from below with its slide.

not permit of his using the bed-pan without inevitably causing an unnecessary jerk and displacement of the hip.

To do away with these avoidable movements, I have had frames constructed with a large median opening, made on a

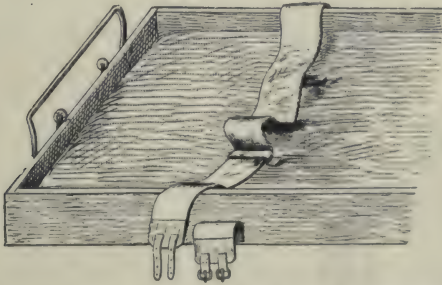


Fig. 402.—Our frame. The strap for the legs is fixed by its middle part so as to embrace the limb in a loop.

level with the seat (fig. 400). When not wanted, the median opening is filled exactly with a cushion, evenly rounded, pushed in and supported by a board sliding in grooves beneath the frame (fig. 401).

At the moment of using the bed-pan, you withdraw the

board, take out the cushion and slide in its place an utensil of suitable shape and dimensions, which is thus adapted to the opening; one draws the board underneath to keep the utensil in place, in the same way as the cushion, for the necessary length of time.

To be assured more certainly of **the fixation of the legs**, one can arrange the straps for the legs and knees in a double loop for each limb (fig. 402 and 403).

The **fixation of the trunk** is effected by two broad straps,



Fig. 403.—Child on his frame. One sees the two straps on the legs and thighs, fixed by their middle portion and embracing the limbs in a double loop. Counter-extension is obtained by the weight of the body, provided that the lower end of the frame is raised by one or two bricks placed under the feet of the wooden supports.

or by a waistcoat of ticking passed over the shirt, a waistcoat of which the two shoulders and lower edges are fixed, by leathern straps to the sides of the frame.

In Bonnet's splint, there is a similar method of fixation; but Bonnet's splint is dear and not easily obtainable. It has another more serious objection: the Bonnet splint is generally badly constructed, is not sufficiently even and flat; it is easily depressed and put out of shape, and masks the deformity which progresses unobserved, so that "one very often releases from a Bonnet's splint a deformed child."



I like much better to employ the ordinary frame as I have modified it. It has the same advantages as the splint without having its inconveniences : it can be made by any cabinet-maker at a very low price ; it may be completed by a hard and even mattress made by an upholsterer or even by the child's mother. The mattress ought to be a little thicker at the level of the seat, to support the pelvis raised up and to prevent hollowing of the back.

One can adapt to the lower extremity of the frame transverse rods, on which, in a groove in place of a pulley, you can pass a cord for continuous extension (fig. 402).

I prefer **both the limbs** to be **supported** for two reasons : the first is that the sound limb being free might, by any exaggerated movement, impart slight shocks to the pelvis ; the second is that it is important, for the future, that the two limbs may be placed under the same regime of absolute rest for the duration of the disease, especially when one is trying to obtain a perfect cure, as is here the case.

As a matter of fact, the cure could not be perfect if one of the limbs—the affected one—were forcibly immobilised—whilst the other—the sound one—could move about unrestrained in the bed. After a year or two of this regime the restrained leg would waste, whilst the free leg would very often become hypertrophied.

When the patient begins to walk again he will not be able to do so in a normal way if one leg is feeble and the other very strong. If the two legs are equally feeble, on the contrary, they will demand the same effort ; they will resume symmetrically and simultaneously their power and their usefulness. The legs being more equal, walking will be more regular and the cure more perfect.

So as to omit nothing, we may add that children lying down are generally clothed in long blouses of flannel, open behind from top to bottom.

At meal-times, one allows the child to raise his head slightly whilst his shoulders are steadied by a small cushion.

To entertain the children, we promenaded them once or twice a day in small carriages, *on level ground*, to avoid shaking.

About every six weeks, one takes the child from his frame or out of his splint, placing him on an ordinary table, which



Fig. 404.—Legging made of ticking or of leather for continuous extension.

allows one to verify the position and the condition of the joint. The mother will avail herself of the opportunity and make the



Fig. 405.—Extemporised apparatus for continuous extension. The foot is bandaged up to the malleoli. A bandage is placed in stirrup fashion under the sole; the two ends of the bandage are applied to the limb up to the groin.

complete toilet of the little patient. This monthly examination helps to prevent the hip-joint becoming stiff.

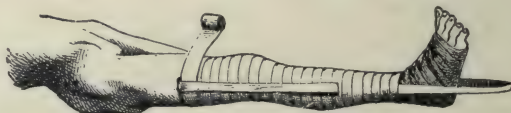


Fig. 406.—The two ends of the stirrup are covered to above the knee. They are afterwards turned on each side of the limb and the bandage is rolled downwards over them to the malleoli.

## (2) CONTINUOUS EXTENSION

You know already well enough how to make continuous extension for fractures of the thigh; you have only to apply it to the treatment of hip-disease.

There are many ways of fixing to the affected limb the cords which sustain the extension weights. If you have a method you are familiar with, keep to it.

If you are used to strips of adhesive plaster, all is well; make them run up to the upper third of the thigh so that they act on that and not on the leg.

If you have no method you prefer, this is what I advise, because it may be used everywhere, and the parents are in a

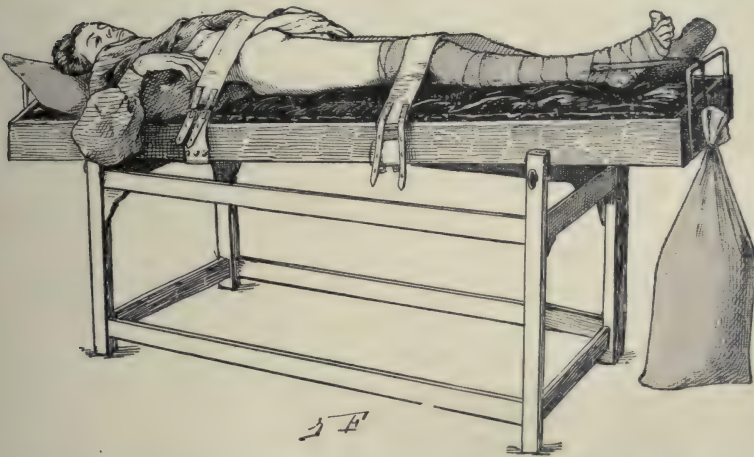


Fig. 407.—Continuous extension: The patient is put to bed and kept there with an extension apparatus. Counter-extension is secured by raising (at the lower end) the chassis upon which the splint rests.

general way able to look well after the child in your absence, a necessary provision in order that the extension may be properly continued.

### Extension

(a) *Extension*.—Have made in ticking, or, better still, in soft leather, a long stocking which reaches to the upper third of the thigh, laced in front, with eyelets, and a “tongue” as used with boots (fig. 404). There should be no seam at the heel;



you may even make an opening to avoid any sore at that point. From the calf of the stocking starts, on each side, a leathern thong, which is kept away from the malleoli, in order to avoid all pressure, by means of a wooden rod placed transversely, slightly longer than the breadth of the sole of the foot, and at each extremity of which is fixed a hook passing through a hole at the extremity of each thong.

At the middle part of the rod is another hook to which a cord for carrying the weight is fixed; this cord passes over a pulley, or, in default of a pulley, over the transverse bar at the foot of the bed or of the frame; or even through a hole cut out of the end board of the frame or wooden bed. Nothing is more easy to adapt. At the extremity of the cord one fixes leaden weights or sand-bags, weighing 2, 3, 4 kilogrammes, according to the age of the child and the result which is aimed at. If you are correcting a deformity, you increase the weight up to 6, 8, 10 kilogrammes.

The stocking should be laced more or less tightly; in any case, so firmly that it is not displaced by the weights.

It is a matter for judgment on the part of the mother; she should decide on the weight the child can bear.

### Counter-extension

(b) *Counter-extension*.—The most simple method of effecting this is to raise the feet of the bed, and fix the patient, that is, restrain the child's trunk on the bed or frame by means of Velpeau bandages (see fig. 407, 408). One might also make counter-extension by placing a skein of very soft worsted in the groin and adapting the two extremities of this skein to two rings fixed at the upper part of the little bed, in such a way as to pull from above on the corresponding side of the pelvis of the child. If the limb is in abduction, the skein is placed in the groin of the affected side. If the limb is in adduction, the skein will be placed in the groin of the sound side.

*Steadying* the trunk with a closely fitting *waistcoat of ticking*, the ends of which are fixed to the frame, also ensures counter-extension.

After a time, a very short time, the care of the extension may be confided to the mother or to a nurse; that is why I suggest this system in preference to any other, because the practitioner himself can scarcely exercise superintendence very frequently. By following carefully your instructions, and after a little practice, intelligent mothers will learn to do much with

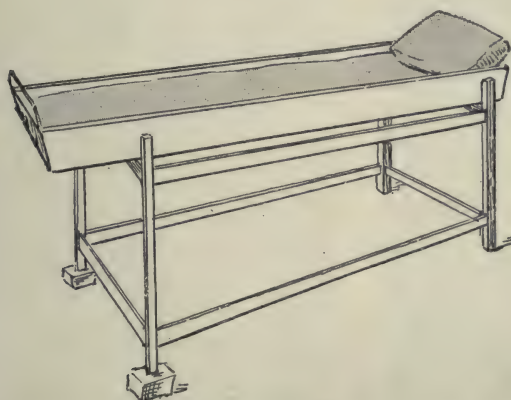


Fig. 408.—Counter-extension is very easily effected by placing bricks under the feet of the fore part of the bed or of the chassis which supports the frame.

continuous extension; but this therapeutic method demands very great care and a certain amount of skill. If you have no one you can rely on, it is better to give it up.

In hospitals where there are many patients, it is not the most practicable system.

Lastly, one must not expect more from continuous extension than it can effect. There are some cases of **painful** hip-disease or of *obstinate deformities* where it will not answer.

The pain can only be allayed by a good plaster, and the deformity can only be effaced by correction made under

chloroform; whilst the correction cannot be completely maintained except by a large, well-made plaster apparatus.

(3) THE METHOD OF MAKING A PLASTER FOR HIP-DISEASE

There are three patterns of plaster apparatus for the treatment of hip-disease.<sup>1</sup> They differ only in the lower part.

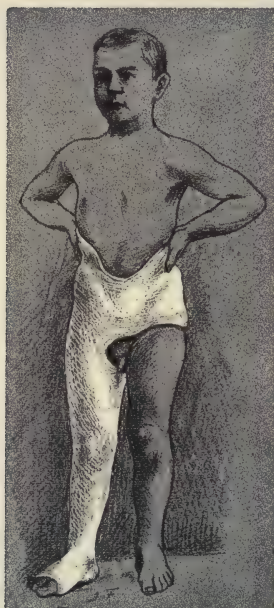


Fig. 409.—The large plaster for hip-joint disease.



Fig. 410.—The medium plaster.

The *large plaster* reaches from the false ribs to the toes (fig. 409).

The *medium plaster* stops at the middle of the leg (fig. 410).

The *small plaster* stops at the line of the knee-joint, and leaves the movements of the knee at liberty (fig. 411).

<sup>1</sup> See thesis of Dr. L. Saint-Beat, 1906.



### The Indications for the Large, the Medium and the Small Plasters

The first is indispensable in the painful cases of hip-disease or those having a tendency to be deformed; more simply, let us say that it is applied to all forms of hip-disease (without distinction) during the period of development of the disease.

The second is applied to cases which are cured, when the patient is first allowed to stand.

The third is used six months later. It is worn for a year and a half at least, until all apparatus is dispensed with.

For private cases, the medium and the small plasters are not often used. Instead of them, when the child begins to walk, he wears a large celluloid, rigid at the hip-joint, but jointed at the knee and at the foot.

We have pointed out at length, in our first chapter, the construction of the plaster apparatus, and we refer you to it for all the minor details. We will mention here only what specially refers to the plaster for hip-disease.

There are **two conditions** to fulfil in order to make a good apparatus for hip-disease.

The *first* is, *not to interpose* between the plaster and the parts to be supported a layer of *cotton wool*, allowing the bones, when the wool has become uneven, to move in the interior of the apparatus.

The *second* condition is, to *carefully shape* the upper margin at the pelvis, to mould the iliac crests by pressing into the plaster with the thumb, above the crests. Without this, they will



Fig. 111.—The small plaster apparatus for walking (applied when the hip-disease is cured).

be able to rise and fall freely, and deformity will be reproduced inside the plaster and in spite of the plaster.

Here are a few simple and safe rules which must be followed in order to make a good plaster for hip-disease at the first attempt.

(a) *As to the covering of the patient.*—Instead of cotton wool, cover him with an ordinary jersey—or even two jerseys, one over the other (slipped on **like pants**)—the sleeve will

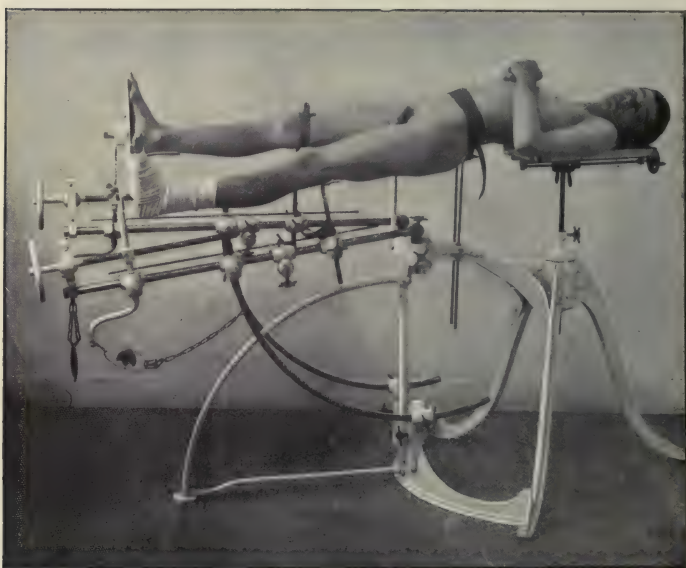


Fig. 412.—Calot table for the construction of plaster apparatus for the lower limb.

cover the leg, and the lower border of the jersey will become uppermost (fig. 415).

For the large apparatus, which reaches from the false ribs down to the toes, as the sleeve ends at the middle of the leg and does not cover the foot, you will make a sock of the other sleeve of the jersey cut beforehand. The upper border of such sock will overlap the lower extremity of the other sleeve at about the knee.

The child thus clothed in jersey, or, rather, double jersey, is placed upon a pelvic-support, of which the plane of support is situated at 15 or 20 cm. above the plane of the table—a pelvic-support which you can improvise everywhere, with two boxes, two foot-stools or two piles of books, in such a way as to

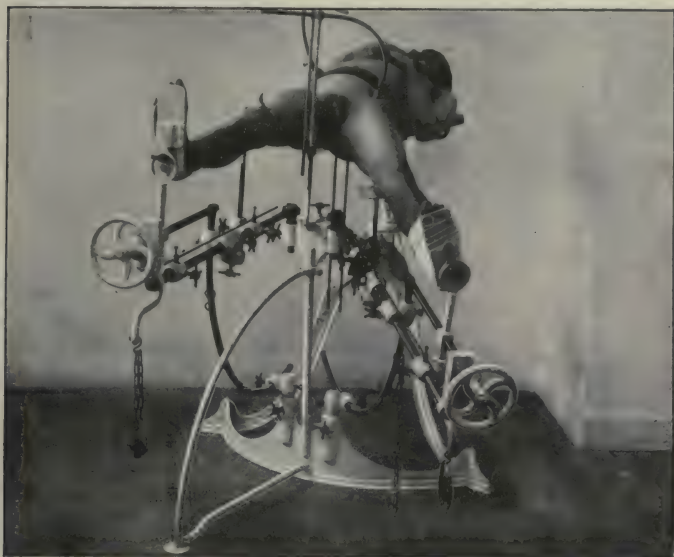


Fig. 413.—By pushing or by pulling (under the control of the dynamometer), one makes abduction or adduction, rotation—external or internal, flexion or hyper-extension.

support on the one part the shoulders and the head, and on the other part the pelvis of the patient (see fig. 416).

The feet are held in the desired position by an assistant, who pulls on the sound leg, if it is the shorter, or pushes against it if it is longer than the affected leg ; a second assistant presses upon the knee of the affected leg and upon the pelvis in order to keep them in extension or hyper-extension.

Accustom yourself, in your practice, to the employment of



these improvised pelvic-supports. If you do so there is no need to go to the expense of these pelvic-supports or those tables which are invented almost everywhere, and which are only "objets de luxe." We have had a table constructed ourselves,

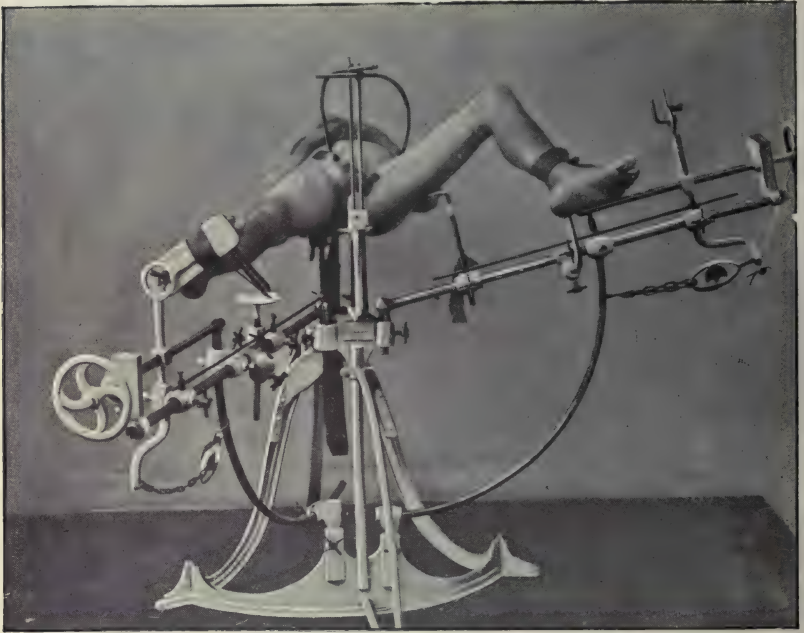


Fig. 414.—Our table for hip-disease which may be used in the treatment of other orthopædic affections of the lower limbs (for instance, congenital luxation of the hip-joint). The pelvis is firmly fixed, and the iliac crests are modelled by two cup-shaped pieces or metal splints. The left thigh is found here in the position we have given for the treatment of luxation of the hip-joint in coxitis (see fig. 444), and also for the treatment of congenital luxation of the hip-joint; the left thigh is found in the "first position," that of the first plaster in the treatment of luxation, while the right thigh is found in the "second position," that of the second plaster (see p. 757 and 763).

and we give a representation of it here (see fig. 412 to 414) in order to show you precisely, that its rôle may be filled as perfectly, and at much less expense, by the improvised support of which I have spoken (see fig. 415 and 416), with the help



Fig. 415.—The child clothed in his single or double "tights," worn after the manner of pants.



Fig. 416.—Improvised pelvic-support.

of assistants, also improvised, whom you will find everywhere, in the family circle of your patient.

(b) *Construction of the Plaster.*—You prepare your **plastered strips** in the way described for the apparatus for Pott's disease, that is, you will prefer plastered strips dusted beforehand to strips dipped in the plaster cream (see Chap. I. and Chap. V.).

You apply the strips, observing the recommendations already given.



Fig. 417.—Applying the first bandage.

You must **spread them out**, apply them **exactly**, but **without pressure**. If you spread them out, there will be no ridges and no hurting. If they are applied accurately, the apparatus will not be too loose. If they are applied without pressure, the apparatus will not be too tight (fig. 417).

Circular turns are made over the trunk, without it being necessary to make reverses. At the groin, make a spica, as you would with a linen bandage. Round the thigh, the leg



and the foot again make circular turns exactly applied, without reverses (fig. 418).

There must be three strips<sup>1</sup> 5 metres long and from 10 to 12 cm. wide for a plaster for a child of ten years.

Remember that the apparatus breaks especially in the inguinal region. Strengthen it at that point by folding the strip several times on itself, or by overlapping several spicas one over the other (fig. 419), or, more simply, with a plastered attelle passed "*en cravate*" around the hip-joint (fig. 420).



Fig. 418.—Applying the last bandage.

**The Plastered Strengthening Attelles.**—The apparatus may be made exclusively of strips, but I would advise you to make it rather with strips and attelles, as you did in the plaster for Pott's disease. The plaster is then stronger, more regular and more easy to make.

We have described in the *General Directions*, Chap. I., the method of preparing attelles and plaster cream.

For a plaster in hip-disease, we introduce four attelles.

<sup>1</sup> Three strips suffice, provided that attelles are added.

(a) The attelle "*en cravate*" already pointed out, is made with three thicknesses of gauze 12 cm. wide and of a length sufficient for surrounding the hip-joint (fig. 420).

(b) A circular pelvic attelle to strengthen the pelvic and abdominal portion of the apparatus (three thicknesses of gauze : length equal to the circumference of the pelvis, breadth equal

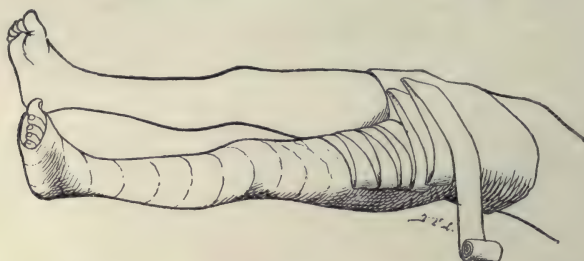


Fig. 419.—To consolidate the fragile part of the apparatus at the level of the affected groin, one folds the bandage over itself several times, which takes the place of the strengthening pads.

to the distance from false ribs to the line of the trochanters (fig. 421).

(c) and (d) Two attelles intended to strengthen, in front and behind, the leg portion of the apparatus. They have a length

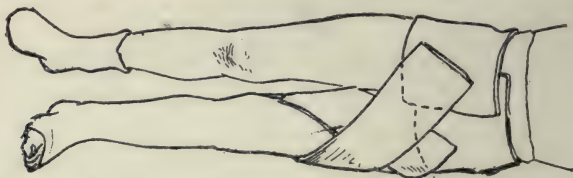


Fig. 420.—Attelle "*en cravate*" for strengthening the groin.†

equal to the distance from the iliac spine to the toes and a breadth equal to half the greatest circumference of the thigh. You may replace these two attelles by a single attelle, like a splint (fig. 421a). The respective places for the attelles and the strips are the same as in a plaster corset (see Chap. V.), that is, you make a first covering with a plastered strip, then you place in

position the four attelles, and, lastly, you make, over the whole a second covering with strips.

Between the different layers of plaster, to strengthen them,



Fig. 421.—The circular attelle for the abdomen.

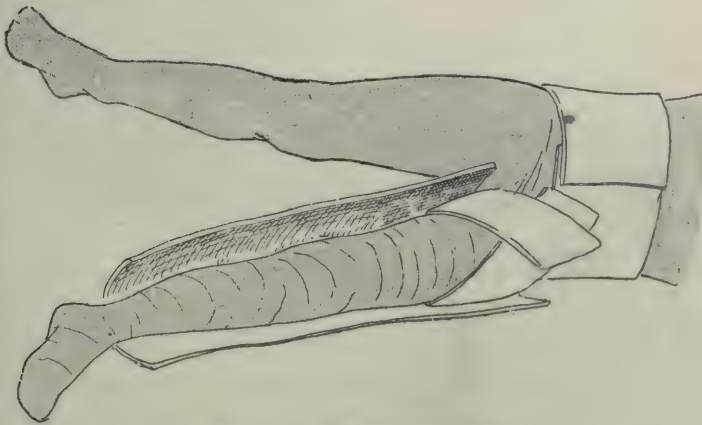


Fig. 421a.—Strengthening attelles :

- (1) As a waist-belt ; (2) "*en cravate*" at the root of the thigh ; (3) as a splint beneath the limb ; this replaces the two attelles, anterior and posterior.

you spread with the hand a **layer** of 1 to 2 mm. of **paste** (true mortar) which binds the whole.

(e) *How to Model the Supported Parts (Iliac Crests, Knee).—*



The modelling is done when the child has been taken down from the pelvic-support and replaced on the table, a few minutes before the plaster sets (figs. 422 to 429).

The iliac crests are modelled by making above (not *upon* the crests themselves, but *above*) and in front of them, a depression in the plaster with the hands slightly flexed, the thumb in front, the other fingers above. Make pressure on the soft plaster below the iliac crests, in such a way as to place them between two



Fig. 422.—The apparatus finished, the child is replaced on the table. Carefully verify and rectify the position. Model the iliac crests. Enclose the patella between two lateral depressions.

depressions; the upper one the deeper, in the ilio-costal space, and the lower, less marked, over the external iliac fossa.

With the hands, you lower or raise one of the sides of the pelvis, according to the indications which are present. Apply the plaster evenly over the condyles of the femur and on each side of the patella, thus enclosing the patella between two depressions.

There is no other secret in making perfect apparatus for hip-disease, and in it all, you see, there is no "witchcraft."

With such a plaster, a leg which is in a good position cannot possibly lose that position (fig. 430).

As to vicious positions, when once rectified and maintained by a good plaster, the correction will not lose even—I do not say centimetres, as is the case with apparatus made by certain careless surgeons—but millimetres.



Fig. 423.



Fig. 424.



Fig. 425.

Fig. 423.—A bad apparatus: apparatus without any depressions, such as are unfortunately too often made.

Fig. 424.—In this apparatus the iliac bones can be freely inclined and displaced. A badly-made apparatus.

Fig. 425.—A well-made apparatus, well modelled over the iliac crests and at each side of the patella. The iliac bones cannot be displaced either upwards nor downwards. The knee cannot turn in the apparatus.

*Trimming the Apparatus.*—A quarter or half an hour after the plaster is “set,” trim and make the edges even by cutting down to the jersey only. Cut first the upper edge of the plaster over the abdomen, in the form of a crescent, in such a way as to leave the umbilicus exposed, then disengage the genital organs and the toes (see fig. 409). After which, the child may be carried

back to his bed ; but it is wise not to move him too much until



Fig. 426.—Method of moulding the iliac crests ; position of the hands for moulding the apparatus upon the iliac crests.

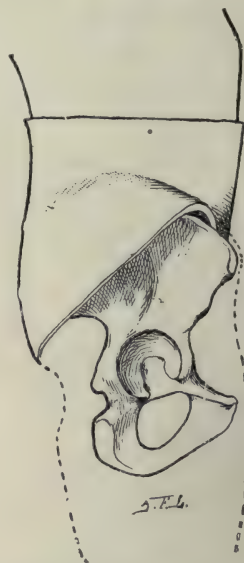


Fig. 427.—Sketch of an apparatus well modelled above the iliac bones.



Fig. 428.—Schematic sketch of the knee in a **badly-made apparatus**; the apparatus being circular, the knee is able to turn round in every direction.



Fig. 429.—An **apparatus well made**. The depressions made at *d*, on each side of the patella, prevent the knee turning round.

the next day ; during those twenty-four hours, the plaster, still drier, will have gained much in firmness.



*Openings in the Plaster.*—It is not until the next day that you will make any opening necessary for treating an abscess or making an injection into the joint (fig. 431).

If the child complains of pain at some point—heel, malleoli, iliac spines—you may relieve those points by removing a small



Fig. 430.—The plaster in its rough state.



Fig. 430a.—The plaster trimmed and polished.

piece of plaster, as if it were punched out. The openings, great or small, are simply made with a good knife; cut millimetre by millimetre until you feel you no longer cut the plaster but touch the jersey; by proceeding cautiously you need have no fear of injuring the skin and you will now appreciate the advantage of the double jersey.

#### (4) TECHNIQUE OF STRAIGHTENING THE HIP-JOINT

*Before describing this technique, we must remind you of the differences which exist between recent deformities (abduction) and old deformities (adduction).*

**Abduction at the beginning** of hip-disease being due to muscular contractions, is nearly always easily corrected.



Fig. 431.—The medium plaster with openings at the hip and at the knee.

This is very fortunate. For at the beginning, **especially in the painful cases**, one is dealing with **active tuberculosis**; and our duty is to make the correction by the most gentle and the **shortest** manœuvres, abstaining, above all, from the manœuvres of movement in all directions so highly praised by Bonnet (of Lyons), which are unfortunately those described in all the classical treatises.

Violent and prolonged manœuvres are dangerous, because they may lead to a bruising of the virulent granulations and excite infection at a distance. One will carry the affected limb *directly and as gently as possible*, inwards and downwards.

If the correction demands, so as to be complete, some vigorous



Fig. 432.—Vicious ankylosis, flexion, adduction and internal rotation.



Fig. 433.—Correction without chloroform. First apparatus (1st stage).



Fig. 434.—Second apparatus (2nd stage).

movements, one will be satisfied, for the time being, with a partial correction to be completed two months later.

**The vicious position of adduction** supervening in hip-disease of old standing, calls for more vigorous tractions.

These manœuvres are then permissible, as the tuberculosis is less virulent and sometimes extinct in such old cases of hip-disease.

The straightening may be done with or without chloroform.



**FIRST METHOD: Correction without Chloroform**

(By stages: a new plaster every month, fig. 432 to 436) 

One may bring about a correction by making a new plaster apparatus every month, each new apparatus placing the limb in a position more and more correct. One gains several degrees each time, without pain, by slight traction and slight pressure



Fig. 435.—Third apparatus  
(3rd stage).



Fig. 436.—Sixth apparatus (6th stage).  
The correction is perfect.

made immediately after the application of the last plastered strip and kept up until the plaster is quite dry.

One obtains in this way, in the space of from two to four months, surprising and often complete corrections.

Nevertheless, for very marked deformities, one is generally obliged to make a last sitting for correction under chloroform, if one wishes to do away with the very slight deformity which persists.

SECOND METHOD: **Correction with Chloroform***(See Anæsthesia, Chap. II.)*

Correction under anæsthesia is very simple ; and *unless it is a case of painless hip-disease and of recent and slightly vicious position, I advise you to have recourse to it.*

With the help of chloroform one can accomplish, in a minute or two, without any violence, the correction of recent deformities.



Fig. 437.—Right hip-disease with extreme abduction.

At once, one applies a good plaster apparatus ; the whole thing takes from six to ten minutes and secures three months' rest and perfect comfort for the child.

It is, as one can see, the most easy and the most rapid method.

We will now describe in order : 1st, the straightening of a recent deformity (in abduction) ; 2nd, the straightening of an older deformity (in adduction) ; 3rd, the straightening of old ankylosis of the hip-joint ; 4th, the treatment of luxations.

FIRST CASE (fig. 437).—**Hip-Disease with Abduction and Lengthening**  
(*Hip-disease dating several weeks or months, more or less painful*)

The patient is removed to an ordinary table which is quite firm, and then anæsthetised. If the coxitis is very painful, the patient should be anæsthetised previously in his bed and then carried to the table.

1ST STAGE (fig. 438).—*Placing in Position the Pelvis and Trunk.*—Place the trunk and pelvis flat and in good position



Fig. 438.—**Correction.** 1st stage : Placing in position the pelvis and trunk.

on the table. This is easily done. It suffices to take the affected leg by the foot and the knee and carry it in the direction of the deviation, that is, further in abduction and in flexion until you have in this way totally obliterated the lumbar hollow and brought back the iliac spine of the affected side to the same level as that of the sound side, so that they are both placed in the same line perpendicular to the axis of the body.

You have thus before your eyes, *in its entirety*, distinctly seen, the vicious positions to be corrected.



Fix the trunk and pelvis in the normal position which you have given them.

You cause the affected thigh to manœuvre round the pelvis, in order to bring it back to a correct position.

2ND STAGE (fig. 439).—*Fixation of the Pelvis and Trunk in the Normal Position.*—One assistant only is generally sufficient to effect this fixation; the same one who held the sound limb, whilst you were placing the pelvis in position by acting on the

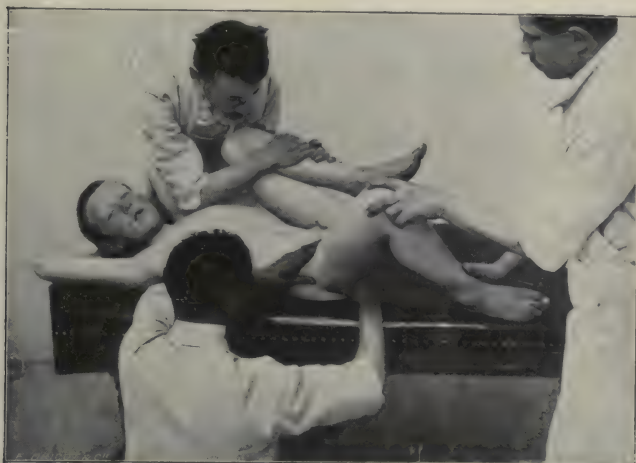


Fig. 439.—**Correction.** 2nd stage : The manner of fixing the pelvis and trunk in the normal position.

affected leg. This assistant bends the sound limb over the abdomen, and **through the medium of the flexed limb presses on the trunk and on the pelvis** in such a way as to keep them in close apposition with the table, taking care that the two iliac spines are always at the same level and that the hollow remains obliterated.

An additional assistant can render this fixation still more perfect; kneeling down by the affected side of the patient, seizing with one hand the ischium of the affected side, with

the other the ala of the ilium, he pushes forward the ischium and brings back the iliac crest behind upon the plane of the table, in such a manner as to prevent the iliac crest of the affected side tilting forward, which it will have a tendency to do when you carry the affected femur into good position.

**3RD STAGE** (fig. 440.)—*Correction.*—The pelvis placed in position and well fixed, you have only to carry the femur into the normal position.

With one hand you seize the knee, with the other the foot.



Fig. 440.—**Correction.** 3rd stage: The affected leg is being carried inwards and downwards by the left hand of the surgeon while with the right hand he pulls slightly on the foot to facilitate the correction.

With the first hand you pull slightly upon the femur, as if to detach it from the iliac bone; then, with a simple pressure of one or two kilograms, you push it directly into the correct position, that is to say, **inwards and downwards**. It is sufficiently inwards when the knee reaches the prolonged median line of the body, and it is sufficiently downwards when the ham of the affected side touches the table.

Having in view the tendency which the leg will evince later on to pass into adduction, allow an abduction of from  $10^{\circ}$  to

15° to persist. On the other hand, one ought to go a little further towards deflection and make a slight **hyper-correction**. To do this, carry the pelvis over the lower end of the table and lower the affected **knee** for 5 or 10 cm. **below the prolonged plane of the table**, pressing on the knee from above downwards.

This manoeuvre requires a few seconds. You verify the correction (fig. 441) by taking the two feet (the sound flexed



Fig. 441.—**Correction (continued).** The sound leg being placed back in extension; the surgeon, holding the feet, verifies the correction.

leg has been put into normal extension) and comparing the position of the two malleoli and the two heels, whilst an assistant, one hand on the knee of the affected side, keeps it in the position of hyper-extension.

There is nothing more to be done but to preserve the correction thus obtained, by a plaster apparatus.

4TH STAGE.—*Construction of the Plaster* (see p. 422).

5TH STAGE.—*Verification of the Correction a little before the*



*Setting of the Plaster.*—The apparatus being finished, one removes the child from the pelvic-support, places him gently on the table, the legs projecting over the end to facilitate the hyper-extension. The correction is again verified, completed if need be, and maintained very exactly in position until the plaster becomes dry.

The assistant who models the iliac crests ought to see that the iliac spines are at the same level and that *every trace of the lumbar hollow is obliterated*; to do that, **he presses vigorously**



Fig. 442.—Hip-disease with adduction already a year and a half old.

from before backwards (or, more correctly, **from above downwards** in the recumbent position of the trunk).

If necessary, an additional assistant acts on the ischium and the iliac crest, as we have mentioned above, to effect *the obliteration of the hollow*, which can never be overdone. One can further this indirectly by making hyper-extension of the thigh; to do so, an assistant **presses on the affected knee from above downwards**.

You attend, yourself, either to the pelvis or to the feet, and control every moment the perfecting of the correction. You pull or push on one foot or the other, asking, if necessary, for

the help of the assistant who has his hands above the iliac crests and who is able, by pressing on one or other of the crests, to lower or raise one of the sides of the pelvis.<sup>1</sup>

*Duration of the Interference*

Correction properly so-called takes from one to two minutes ; the construction of the apparatus, five to ten minutes ; the



Fig. 443.—**Correction of Adduction.** *1st stage* : Placing in position the pelvis and trunk (the iliac spines are marked by two dots).

setting of the plaster takes, afterwards, six to eight minutes ; the entire length of the correction is therefore about fifteen minutes.

I have supposed a case where chloroform has overcome, by itself alone, nearly all resistance. If the deviation in abduction is

<sup>1</sup> If the assistant who grasps the ischium pushes it upwards whilst the surgeon who holds the foot pulls on the leg, you manage thus to fix the hip in the plaster apparatus, with a certain amount of separation of the articular surfaces.

very old, if it has already produced fibrous adhesions, a pressure of from one to two kilograms is evidently not sufficient for correction.

If the resistance of the deviation is greater than that, if that amount of force does not give the perfect correction, it will always give you a very appreciable correction, thanks to



Fig. 444.—**Correction of Adduction.**—*2nd stage*: Fixation of the pelvis and trunk by two assistants, the sound limb bent over the abdomen. Here, the operator alone seizes the leg in order to move it into the correct position.

chloroform. Do not go further than that, if you are prudent. You will complete the partial correction six or eight weeks later. It will still be easy then, and certainly it will be no longer dangerous; for the tuberculosis will have lost much of its virulence by the sole fact of the perfect immobilisation of the hip in a plaster apparatus for those two months.



SECOND CASE (fig. 442).—**Hip-Disease with Adduction and Shortening**<sup>1</sup>

(This is the ordinary deformity of hip-disease of rather long standing,  
a year or more)

The correction of adduction (of shortening) necessitates generally more force than that of abduction; but the correction will be harmless if it is carried out in the following manner:—

1ST STAGE (fig. 443).—*Placing in Position the Pelvis and Trunk.*—The pelvis and trunk are placed flat on the table, and in their normal position. This is done as it was for the preceding



Fig. 445.—**Correction of Adduction.**—3rd stage : The correction is finished.

vicious position, with this difference, that instead of carrying the affected leg into flexion and abduction, one is obliged to carry it into flexion and adduction, so as to succeed in obliterating the lumbar hollow, and to bring the two iliac spines to the same level, towards the same perpendicular to the median axis of the body.

2ND STAGE (fig. 444).—*Fixation of the Pelvis in that Position* by one, or better, two assistants (see fig. 439).

<sup>1</sup> See the thesis of Dr. L. Saint-Béat, 1906.

3RD STAGE (fig. 445).—*Correction.*—You grasp the thigh of the patient above the knee with both hands, whilst an assistant seizes, with the left hand, the lower part of the leg in the neighbourhood of the malleoli, and with the right hand, grasps the middle of the foot; both of you, by an associated and well-combined effort, pull on the limb so as to detach it from the iliac bone; you pull in the direction of the deviation,



Fig. 446.—The right, sound leg is placed in extension (for the preparation of the plaster apparatus) and pushed upwards. The left, affected leg is pulled firmly and carried further in abduction. This traction is made by one or two assistants.

that is, upwards and inwards. Then, when you feel that the leg “holds” less to the pelvis, you carry it at once (pulling all the time) into the normal position, that is, outwards and downwards, in order to obliterate the adduction and flexion.

Adduction is corrected when the internal part of the knee arrives in the prolonged median axis of the body. Flexion is corrected when the ham touches the surface of the table.

But here, especially, *correction is not sufficient*; a **hyper-correction must be made**. We shall have hyper-corrected the flexion when the knee is lowered 10 cm. below the plane of the table, the legs being held outside it. We shall have hyper-corrected adduction when the knee is found to be at  $40^\circ$  or  $50^\circ$  outside the prolonged median axis of the body. We must obtain these  $40^\circ$  or  $50^\circ$  at once if we wish to preserve  $15^\circ$ .

An abduction of from  $15^\circ$  to  $20^\circ$ , if it persists, and if the joint is ankylosed in this position, will compensate the slight real shortening which exists nearly always in the case where the apparent shortening is very great.

A leg ankylosed in abduction is, as a matter of fact, functionally, that is, practically, a little longer than it ought to be, if I may say so, owing to the increase of osseous material. Inversely, a leg ankylosed in adduction will be functionally and practically shorter than its real (its substantive) length would suggest.

You will therefore carry the limb into an **abduction of more than  $45^\circ$** . It will be kept fixed for several months in a plaster apparatus. When adhesions have been produced in this position, you allow the limb to return a little inwards with each new apparatus. It is then easy enough to preserve permanently the  $15^\circ$  which are needed to compensate the real shortening.<sup>1</sup>

4TH STAGE.—*Verification of the Position and Plaster*.—Modelling, as above (see fig. 441, p. 437).

### THIRD CASE.—Ankyloses of the Hip-Joint

(in cured, or apparently cured, hip-disease)

After the study of the second case comes naturally that of the correction of very old deformities, the correction of vicious ankyloses *which are only a more advanced stage of the deviation in adduction of which we have just spoken*.

<sup>1</sup> Definite persistent abduction ought not to exceed  $15^\circ$  to  $20^\circ$ , because above that amount it will bring about, in walking, a lowering of the pelvis, prejudicial to the regularity and elegance of the gait.



In reality, it is **nearly always** a question (see p. 402) of **incomplete, non-osseous ankylosis**. If one does not elicit any mobility of the femur, this does not imply that the union is osseous and complete. It is necessary for you to try to find movement under chloroform before you can affirm that there is none.

If the ankylosis is incomplete, one forcibly straightens; if it is osseous, one performs osteotomy.

#### A.—CORRECTION BY SIMPLE STRAIGHTENING

One can perform this straightening<sup>1</sup> in two ways: **either without chloroform**, in several sittings, at the rate of one every twenty days, by partial corrections and successive plasters. After three to five plasters and two or three months' treatment, the correction is obtained (see fig. 432 to 436).

**Or with chloroform**, in one or two sittings.

The second procedure is easier, more certain and less painful to the patient, in spite of appearances to the contrary.

You know already the direction to give the manœuvres for straightening, but it is evident that one ought here to use manœuvres much more vigorous than in deviations in the same direction occurring in the course of active hip-disease, and of only a few months' standing.

You straighten in the manner described above for the second variety, since the thigh is nearly always in adduction. Proceed gradually, slowly, patiently; correct **especially by firm traction** on the leg, without, however, neglecting the pressure on the knee, or, rather, on the middle of the femur.

You will break nothing if you correct degree by degree, methodically, **without jerks**.

You must be three or four in number to do this. Whilst two assistants pull on the leg and the foot, two others should

<sup>1</sup> See, **with reference to straightening of ankyloses of the hip**, the excellent thesis, full of information, of Dr. Quettier, of Bercé (1894).

make pressure on the thigh and push it downwards and outwards; **make pressure** with four hands evenly and methodically, without cessation, for 10, 12, 15 minutes. You will then arrive at the result aimed at—without danger—if you have taken care to press rather on the middle third of the thigh than on the knee exclusively, because excessive pressure on the knee with the force of such a lever might bring about a fracture. Or, still better—in order more certainly to avoid that risk—you may take the precaution of placing four wooden splints along the leg from the trochanter to the malleoli, the splints being firmly fixed with straps; and it is on the middle of the thigh, thus strengthened, that you exert pressure.

It will often be necessary for you to spend 10 to 15 minutes, or even more, in continuous traction and pressure before obtaining the required result,<sup>1</sup> that is before having carried the affected knee to 15° below the plane of the table and 40° to 50° without the median axis of the body.

By means of the manœuvres thus described one works at the same time against all the resistances, which are of two orders :

1st. The *extra articular resistance* proceeding from the contraction of the soft tissues, but especially of the adductor and flexor tendons.

2nd. The *articular resistance* arising from contraction of the capsule or from old fibrous or osteo-fibrous adhesions uniting the two osseous extremities.

Instead of working **at the same time** against the **diverse resistances**, it is often preferable to **isolate them** and **attack them one after the other**. If, then, in commencing the redressment, you are hindered by the cords of the tendons which appear very tense and hard, you must, during the first stage, attend to them specially and exclusively, and thus more

<sup>1</sup> And, in certain cases, you will not reach it at the first attempt. You will obtain only half a correction, which you will complete at a second sitting for redressment, made three or four weeks later.

easily overcome their resistance. This obstacle overcome, the redressment will proceed easily, because the contracted tendons represent often half, or even more, of the total resistance.

There are two ways of acting on the tendons : one surgical, the other non-surgical.

If you are not a surgeon *keep always to the latter*, and you will succeed simply by the pressure of the thumbs over the pro-



Fig. 447.—Rupture of the adductors. One assistant fixes the pelvis, the other moves the limb into hyper-extension and abduction. The operator presses his thumbs with all his strength, over the origins of the adductors.

jecting cords of the contracted tendons, in making them supple, by kneading them, stretching them, and even rupturing them.

(a) **Rendering supple, kneading and stretching of the tendons.**—You will carry out the manoeuvres indicated in Chap. XIV. *à propos* Congenital Dislocation of the hip, but you will carry them out here with the thigh extended, and not flexed.

(b) **Rupture of the adductor tendons** (fig. 447).—Two thumbs pressing crosswise upon the tendinous cord which one or two assistants, pulling the leg outwards, stretch to the



utmost. After pressing for 1 or 2 minutes, one feels under the thumbs a tendon give way, then a second, then the others, while the limb is at the same time carried outwards.

**The rupture of the flexor tendons** with the thumbs is very difficult and causes considerable traumatism ; but you



Fig. 448.

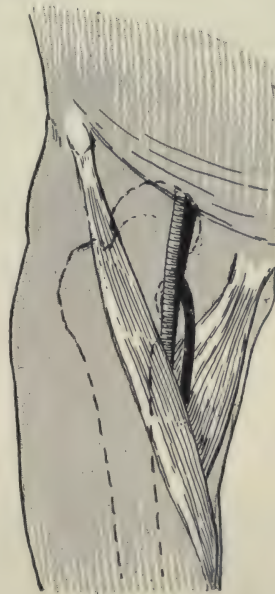


Fig. 449.

Fig. 448.—In adduction, the vessels are in closer proximity to the adductors than in abduction (consequently, move the thigh outwards as far as possible by moderate movements, before making a tenotomy on the adductors).

Fig. 449.—Relations of the tendons and vessels in the position of abduction.

will succeed in stretching them sufficiently by a long and patient kneading.

(c) **Tenotomy.**—If you are a surgeon, you will prefer tenotomy to rupture of the tendons by pressure of the thumbs. The division is more expeditious and does not require any display of force.

**Subcutaneous** tenotomy is done (fig. 448 and 449) by an

incision of a few millimetres, which **prevents most surely all chance of infection** and is also **simpler**, whatever may



Fig. 450.—Tenotomy of the flexors. An assistant pulls on the foot with one hand and with the other presses on the knee downwards to throw the flexor tendons into prominence. The tenotome is entered on the inner border of the sartorius,  $1\frac{1}{2}$  cm. below the iliac spine. The operator pushes the tendons towards the knife with the fingers of the hand remaining at liberty.

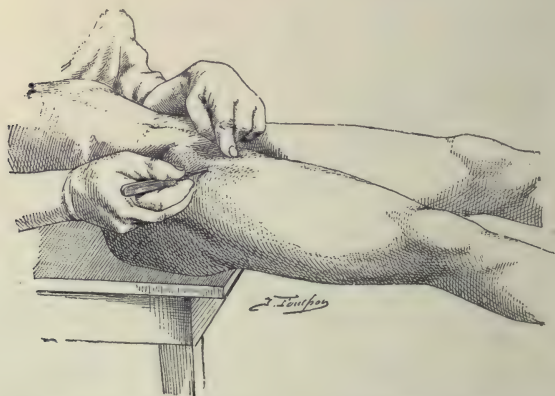


Fig. 451.—Another method of tenotomy of the flexors. Here the tenotome is introduced outside the tendons; the left hand of the operator isolates the vessels and presents the flexor tendons to the edge of the instrument,

have been said to the contrary, than making the section of the tendons by the open method. If some fibres escape the tenotome, they are easily ruptured by making traction, after

the tenotome has been withdrawn. This supplementary traction is likewise necessary, though in a less degree, in open tenotomy, as the contraction which affects all the tissues of the region can only be overcome by this means.

The operation is performed as follows :—

**Instruments.**—1st, a pointed tenotome ; 2nd, a blunt tenotome, or even an ordinary narrow bistoury may be used.



Fig. 452.—An assistant draws the leg outwards to make the cord of the adductors prominent. One cuts the tendons from without inwards. The left hand is occupied at first in pushing the tendons towards the tenotome, then in raising the skin to protect it from the movements of the knife.

(a) **Division of the flexor tendons** near the iliac spine (sartorius, tensor fasciæ, sometimes the rectus).

The division is made at a centimetre and a half below the anterior superior iliac spine, puncturing the skin on the inside of the tendinous cord and cutting from within outwards.

**POSITION OF THE ASSISTANTS** (fig. 450).—An assistant holds the sound limb firmly flexed over the abdomen, to immobilise the pelvis. A second assistant pulls on the affected knee and carries it downwards in extension.



1ST STAGE.—*Cutaneous Incision.*—One makes an incision 4 or 5 cm. long with the pointed tenotome, along the internal border of the prominent tendons, one centimetre and a half below the iliac spine, and one introduces the point to a depth of about two and a half centimetres.

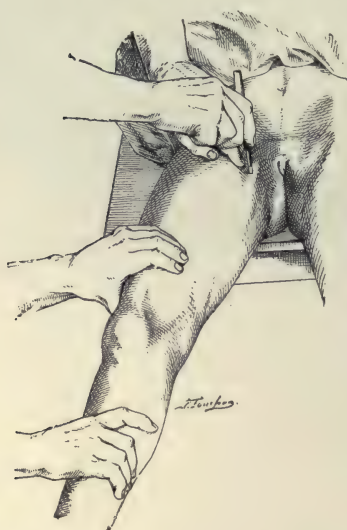


Fig. 453.—Tenotomy of the adductors. The tenotome is conducted by the left index finger, the pulp of which pushes the vessels outwards.

2ND STAGE.—One turns the tenotome so that the cutting edge is outwards; or, one intro-

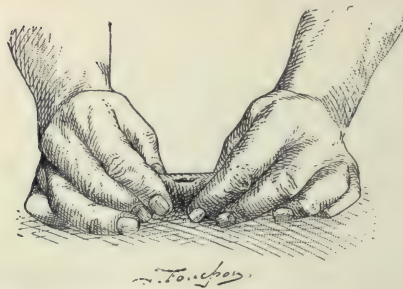


Fig. 454.—Haemostasis after tenotomy: one expels the blood by pressing firmly the two lips of skin, after which one makes double compression.

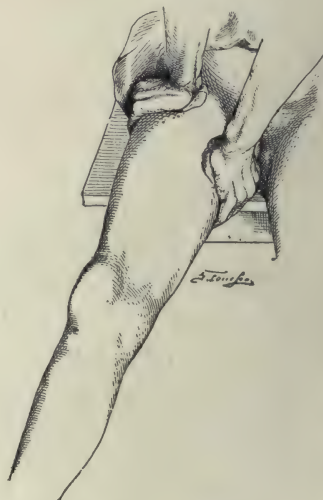


Fig. 455.—Haemostasis. An assistant compresses firmly with both hands, furnished with swabs, the two small wounds produced by the double tenotomy.

duces the blunt tenotome parallel to the incision, to the same depth, then one turns it outwards.

**3RD STAGE.**—One cuts with a sawing movement, whilst the left index finger brings up the tendon inwards on to the edge of the tenotome. One avoids perforating the skin on the outer side with the point of the tenotome.

**4TH STAGE.**—A snap and a cutaneous depression follow the section of the tendons. The tenotome is withdrawn; through the skin you **press very firmly** on the vessels to ensure hæmostasis

By your pressure and by some traction by the assistant at the knee the division of the tendons and the correction of the deformity are accomplished.

(b) **Tenotomy of the Adductors** (fig. 452 and 453).

The operation is based upon the same principles as the preceding one, with the few slight modifications which one anticipates; the **tenotome penetrates outside of the tendons** and not on the inner side, the assistant drawing the limb outwards and not downwards. The division is made one centimetre below the upper insertions along the external border of the cord made prominent by traction outwards. The operator stands on the outer side of the affected limb.

The left index finger is placed on the prominent cord, which is then allowed to glide inwards—without removing the index-finger which is in contact with the outer border of the tendon. Upon the nail of the index finger one places the back of the



Fig. 456.—Where osteotomy may be performed. 1. Cervical, or, rather, cervico-trochanteric osteotomy (the most useful). 2. Trochanteric (also recommended). 3. Sub-trochanteric (generally done, but wrong).

tenotome, which is then pushed into the tissues to the depth desired, and one incises the tendons from without inwards, avoiding puncture of the skin on the inner side with the instrument. One afterwards sees carefully to the arrest of any bleeding, and also to abduction, in order to arrive at the hyper-



Fig. 459.—Ordinary osteotome.



Fig. 457.

Fig. 457.—Cervico-trochanteric osteotomy. Bad transverse direction of the osteotome, which might penetrate into the pelvis.



Fig. 458.

Fig. 458.—Proper direction; should be nearly vertical in some cases.

correction (abduction of from  $35^{\circ}$  to  $40^{\circ}$  at least).

Correction in the two cases is preserved by a very firm and well-modelled plaster apparatus. The compression made to ensure hæmostasis should be continued with the greatest care until the plaster sets. This compression is necessary in



order to avoid a subcutaneous hæmatoma which might become infected in course of time.

#### B.—THE CORRECTION OF ANKYLOSES BY OSTEOTOMY

I have said (p. 401) that you will scarcely ever have to perform an osteotomy, because real hip-disease is hardly ever followed by osseous ankylosis. I myself do not perform more than one or two osteotomies a year, although I



Fig. 460.—Osteotomy (b), see Fig. 461 (a). Position of the patient. In this figure, the handle of the osteotome is held too high. Its direction must correspond with (as in fig. 462) the axis of the shaft.

always have several hundreds of cases of hip-disease under treatment.

Osteotomy should be **subcutaneous** for the same reason that tenotomy is, because subcutaneous interferences are less harmful and offer less risk of infection than those which are done by the open method. The osteotomy severs two-thirds or three-fourths of the thickness of the bone, and one finishes the section by an osteoclasis, which renders the interference almost harmless.

### WHERE SHOULD THE BONE BE DIVIDED ?

From the orthopædic point of view, it ought to be done at the junction of the neck and trochanter (fig. 456).

But because of the situation of the old morbid focus, which may not, strictly speaking, be entirely defunct, it is

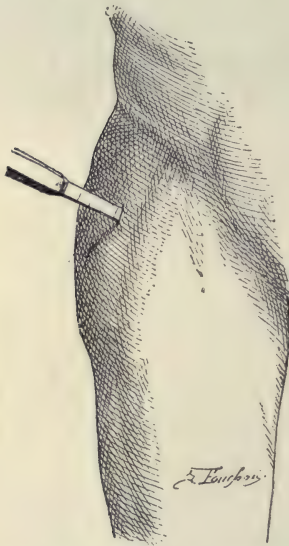


Fig. 461.—Osteotomy. (a)—The osteotome is introduced parallel to the cutaneous incision down to the bone at the junction of the trochanter and the neck. Then the osteotome is turned 90 degrees (Fig. 460. See also Fig. 1115 and 1116).

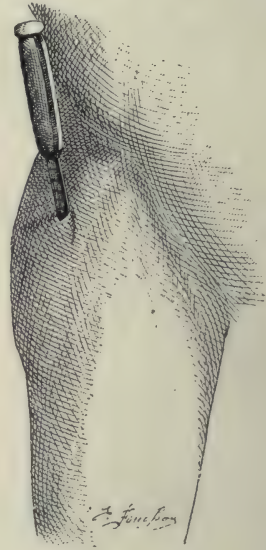


Fig. 462.—Osteotomy. (c)—The direction of the osteotome is then changed; it should correspond to a bisection of the angle formed by the shaft of the femur and a line passing through both acetabula.

better that the rupture should be made a little away from that point.

It will therefore not be made close to the iliac bone—you would be too near the old focus—but at **the most external part of the neck**. In any case, do not go below the middle of the great trochanter (fig. 456, 1 or 2) because you would then be too far below the junction of the trochanter and the neck, and the gain by your operation would be much lessened

from the point of view of lengthening of the limb; it is for that reason we condemn subtrochanteric osteotomy which is recommended in some works; it is somewhat easier, it is true, but it is distinctly less advantageous. In order to meet the case, you may attack the bone at **one or one and a half centimetre below the superior border** of the great trochanter (fig. 456, 1 and 2).

The section should not be transverse—one would run the risk of penetrating the iliac bone—it should sometimes be almost vertical (fig. 458). It will have practically the direction of a bisection<sup>1</sup> of the angle formed by the shaft of the femur and the axis of the acetabula (fig. 458 to 463).

Then, by prolonged pressure, ensure hæmostasis, and fix the limb in hypercorrection (fig. 465). The after-treatment is the same as for simple straightening. One leaves on the large plaster for six months, then one makes the child get up with a small apparatus—which will not be dispensed with until a year and a half later, when the position will be permanently preserved.

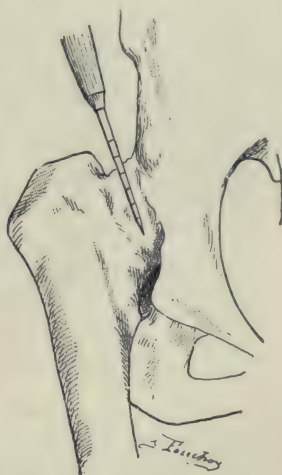


Fig. 463.—Carry the instrument quite near the trochanter, further outside than is shown in this figure. The osteotome penetrates by a few strokes of the mallet, making a section of two-thirds or three-quarters of the bone.

### Osteoclasis

Although it is, in reality, a little more traumatising and a little less exact than osteotomy, manual osteoclasis may be of service

<sup>1</sup> This indication is sufficient for practice, because one has never to do with adductions of less than 45 degrees (in osseous ankylosis). But the indication would no longer be reliable for an extreme adduction, say of 80 degrees, for instance; it would be necessary in that case to perform subtrochanteric osteotomy.





Fig. 464.—Osteotomy (*continued*). The bone being divided up to two-thirds or three-quarters of its diameter, one removes the osteotome and **finishes with an osteoclasis**. To do this, the thigh is carried very firmly into flexion and adduction as if one wished to exaggerate the existing deformity (this is the first stage of the final osteoclasis).



Fig. 465.—Afterwards (2nd stage) the thigh is carried into the desired position, that is, into hyper-extension and forced abduction.

for children whose parents do not wish at any price to hear one speak of osteotomy, nor of blood, nor of a hole in the skin. I have performed it under these conditions without accident, with an excellent final result. Nevertheless, I do not advise you to have recourse to it except in case where the X-rays have demonstrated

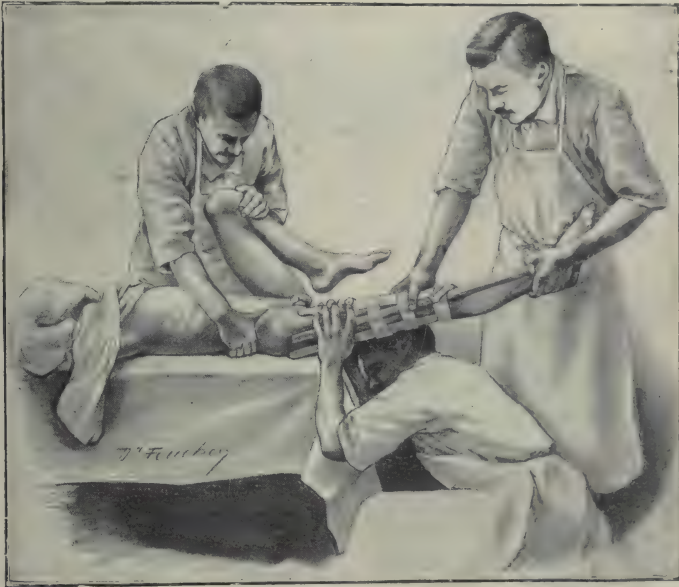


Fig. 466.—Osteoclasis. An assistant (or better two or even three) holds the pelvis firmly. The operator seizes the limb (previously strengthened by means of splints tightly strapped); another assistant seizes the thigh as near as possible to its root, and both of them, the operator and the last assistant, push the thigh downwards and outwards until the bone is broken.

a neck very much weakened and atrophied; or when you have found, under chloroform, a few indefinite movements, but not marked enough to justify an ordinary straightening operation.

In these two cases, you have every chance of breaking the bone at the neck or very near the angle.

In order to be successful, you will strengthen the shaft of

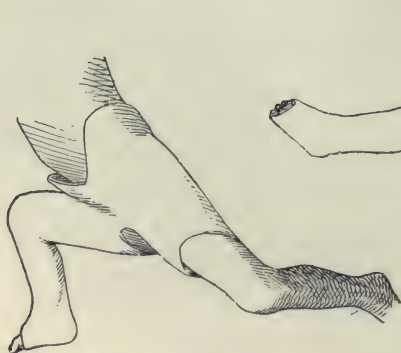


Fig. 467.—Right luxation. 1st position after the reduction (see p. 460). To be quite sure of immobilisation, the sound thigh has been plastered as well.



Fig. 468.—2nd position. The left leg (sound) is still in a plaster collar.



Fig. 469.—3rd position (large plaster). Fig. 470.—4th position. The child can walk.



the femur by means of four wooden splints held by straps tightly fixed ; a veritable apparatus of Scultet (see fig. 466).

1ST STAGE.<sup>1</sup>—One places the wooden splints in position.

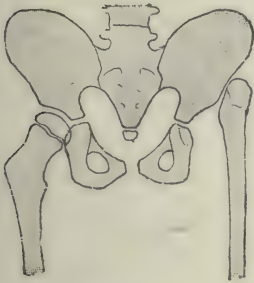


Fig. 471.—Luxation of left hip-joint. Radiogram on Sept. 2nd, 1901.

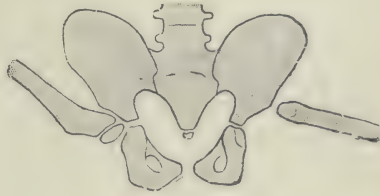


Fig. 472.—Sept. 23rd, 1901. One tried to reduce by an abduction of nearly 90 degrees, but without success.

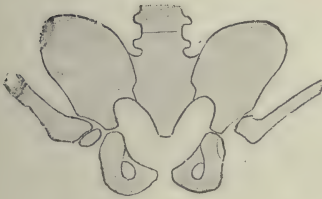


Fig. 473.—Sept. 23rd, 1901. In order to induce the femur to enter the acetabulum, it was necessary to place the thigh **in flexion at an acute angle** on the abdomen, and in abduction of about sixty degrees.



Fig. 474.—Oct. 28th, 1901. A month later, an attempt was made to lessen the flexion and abduction. The radiogram shows that the femur has a tendency to escape from its cavity.

2ND STAGE.—While two or three assistants support the pelvis, pressure is made on the middle of the thigh, until the bone is broken.

<sup>1</sup> After being certain that ankylosis is complete.

## FOURTH CASE.—The Treatment of Luxations of the Femur

I said, on p. 404, that if the head of the femur is in good condition, *which is very rare*, one effects the reduction as in a Congenital Luxation of the hip (see Chap. XIV.).

But if the head of the femur is destroyed (*which is the usual*

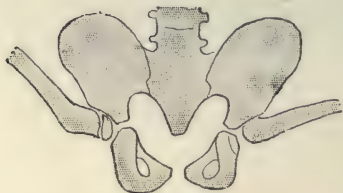


Fig. 475.—Oct. 28th, 1901. Seeing this, one immediately replaced it in the old position of abduction and flexion; the radiogram shows that, once more, reduction is accomplished.

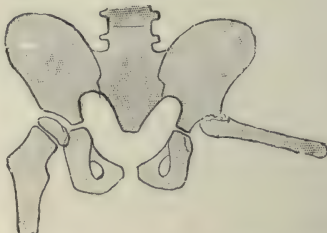


Fig. 476.—Dec. 23rd, 1901. New attempt to put the femur in abduction of 90 degrees. This time the reduction is maintained. One sees that a small bridge of bone has been produced between the edge of the acetabulum and the femur.

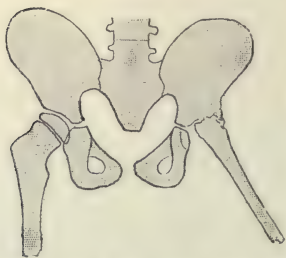


Fig. 477.—May 6th, 1902. The femur has been replaced in position, little by little, in several stages. The reduction is permanently maintained.

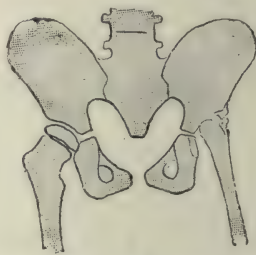


Fig. 478.—June 22nd, 1902. Abduction of about 20 degrees. The reduction is maintained. The small bridge of bone has a tendency to grow. The child walks easily.

condition), one may then implant the trochanter at the bottom of the acetabulum. One must be guided here, at every step, by the indications afforded by radiography. The treatment is difficult, and it is reserved almost exclusively for specialists. It is illustrated in fig. 467 to 478.

FIFTH CASE.—The Treatment of Abscess in Hip-Disease

*The treatment by puncture and injection is the only rational one.*



Fig. 479.—Puncture on the outside of the vessels. The operator isolates the vessel with one hand, whilst he punctures with the other hand.

We have explained its technique at length at the commencement of this work, in Chap. III.



Fig. 480.—Small abscess in front of the femoral vein.



Fig. 481.—The abscess is pushed inwards by pressure of the finger. The needle, directed inwards, against the dorsal aspect of the finger, runs no risk of touching the vein.

Here are some indications relating particularly to the treatment of abscess in hip-joint disease.



*A few precautions to be taken according to the situation of the abscess.*



Fig. 482.—An abscess situated behind the vessels.

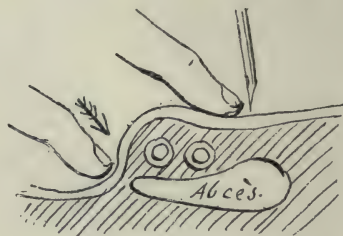


Fig. 483.—A finger firmly presses the skin on the inner side of the vein in the direction of the arrow. The abscess is made to bulge on the outer side of the artery, which is protected with a finger during the puncture.

When the abscess is at a distance from the vessels, there is

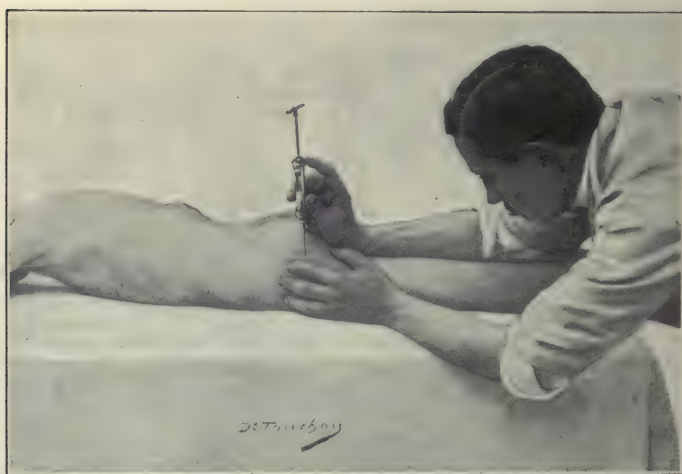


Fig. 484.—Abscess of the buttock. It is easy to avoid the sciatic nerve, which is situated midway between the trochanter and the ischium.

nothing in particular to avoid ; but when the abscess is situated either in front in the region of the femoral vessels, or above the

crural arch, in the pelvis, there are some special points to consider.

(a) BELOW THE CRURAL ARCH (fig. 479).

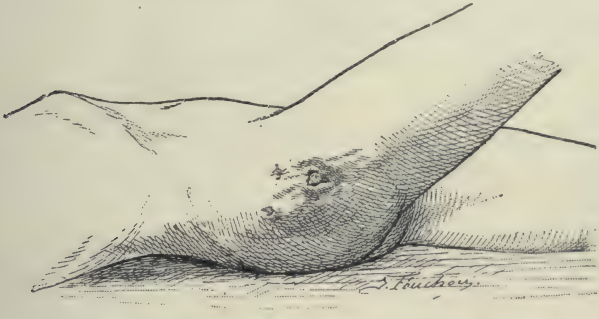


Fig. 485.—Multiple fistulæ (see following figures).

First palpate the femoral artery which you can feel pulsating ; on the inner side of the artery is found the vein, for which you



Fig. 486.—Injection into the fistulous tracks by the **posterior route**. The modifying liquid, injected through A into the articular cavity returns by the fistulous orifices which one blocks with a large swab. One has followed here the external route in order to penetrate into the joint instead of the anterior route indicated on p. 388. But one may follow the anterior route if one wish.

will allow a centimetre and a half. You will then ascertain where you ought to approach the abscess, whether outside the artery or inside the vein. That depends on the facility with

which pressure by the fingers makes the purulent collection bulge more obviously and more distinctly on the outer side or the inner side (fig. 480 and following).

When you have decided where the puncture is to be made, internally or externally, your assistant attempts to pass his finger under the vessels, on the side opposite to that you are going to

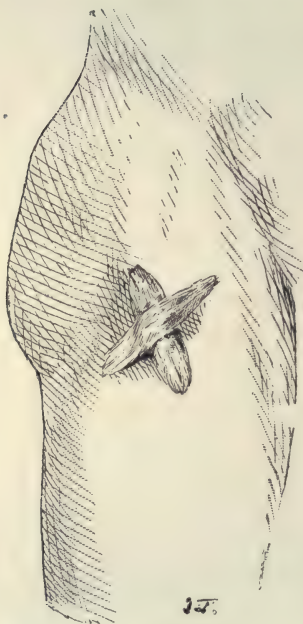


Fig. 487.—Dressing after injection. 1st. Two swabs are placed cross-wise over the fistula to keep it closed.



Fig. 488.—An assistant keeps the swabs in position whilst the bandage is applied. This will assure the obliteration of the fistula from one injection until the next.

puncture, and he will push the collection towards you; it becomes, by this manœuvre, more easily accessible. You avoid in this way wounding the vessels (fig. 480 to 483).

Suppose, however, you do wound them: at once, a jet of blood issues through the needle; withdraw it immediately and place your finger over the puncture, pressing for a moment, then,



as in dressing a phlebotomy of the arm (it is in fact the same thing), apply a compress of cotton wool over the bleeding point with some turns of Velpeau bandage. The slightly compressive dressing will be removed after five or six days; after which you will recommence your punctures, going a little further away from the vessels, either inwards or outwards.

(b) ABOVE THE CRURAL ARCH. An assistant causes the purulent collection to bulge more plainly by pressure exerted from above upon the internal iliac fossa.

You keep close to the crural arch with your needle, to be sure of avoiding the peritoneum, and you keep to the outside of the vessels or inside of them, as the case may be (see also fig. 317 to 323).

(c) BEHIND THE THIGH (fig. 484).—You will avoid the sciatic nerve by remembering that it passes, as one knows, midway between the trochanter and the ischium.

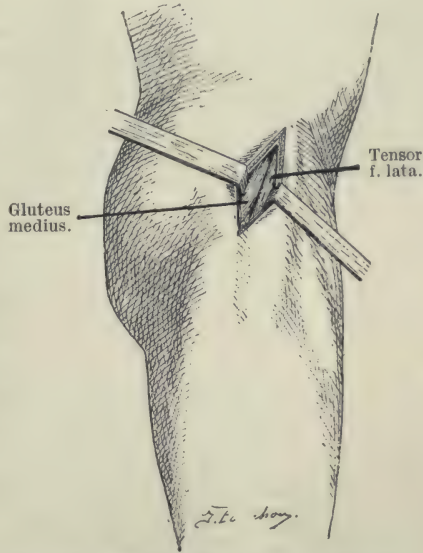


Fig. 489.—Sketch of the incision, either for drainage of the joint, or for resection. The space which separates the Gluteus Medius from the Tensor Fasciæ is seen at the bottom of the incision.

#### SIXTH CASE.—Treatment of Fistula in Hip-Disease

The treatment should be suggested by that described (Chap. III. and V.) for fistulæ in general, and for the fistulæ of Pott's disease. But here, at the hip-joint, one may do more (see fig. 485 to 488).

**Drainage, Arthrotomy and Resection of the Hip-Joint.**—We have mentioned (p. 376) the respective indications for these.

*Drainage* is effected, as everywhere else, by means of

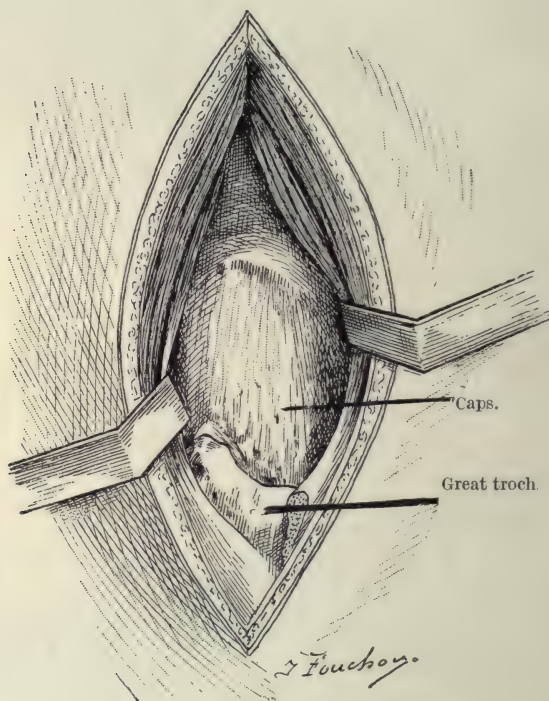


Fig. 490.—The capsule of the joint is seen through the interspace.

incisions made at all the points where one suspects pus is retained.

*Arthrotomy*, or the simple opening of a joint, is performed as in the four first stages of resection of the hip-joint and is completed by a thorough drainage.

We will proceed to explain the technique of resection.

**Resection of the Hip-Joint**<sup>1</sup> (fig. 489 to 495)

1ST STEP.—*Incision of the skin* in a line running from the anterior superior iliac spine to the antero-superior angle of the trochanter, exceeding by two centimetres in each direction these two extreme points.

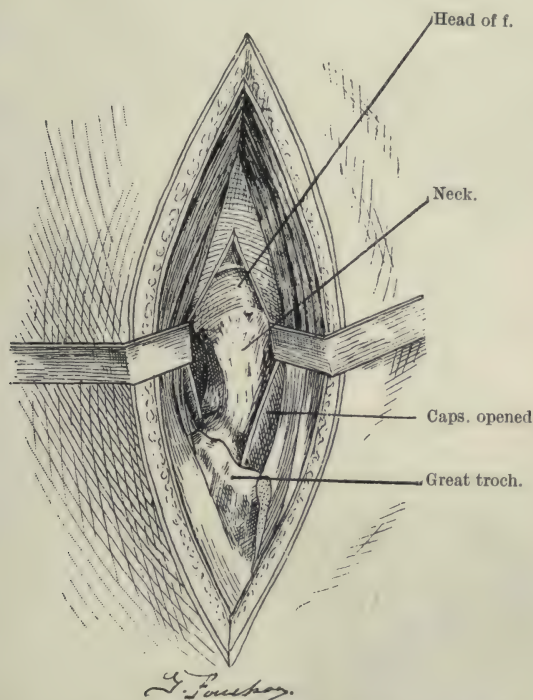


Fig. 491.—Arthrotomy. The capsule of the joint is opened in its entire length and allows the head and neck of the femur to be seen.

2ND STEP.—*Find the interval* between the tensor fasciæ and the gluteus medius and separate their edges. If the interval is not recognisable, which is the case in old standing suppurations about the hip-joint, cut in the direction of the

<sup>1</sup> The indications for which are **so exceptional**, as you will not have forgotten (see p. 376).



cutaneous incision, through the lardaceous tissues, down to the capsule.

3RD STEP.—*Exposure of the capsule*, or of what still remains of it.

4TH STEP.—*Opening the capsule by a crucial incision*. The head of the femur appears.

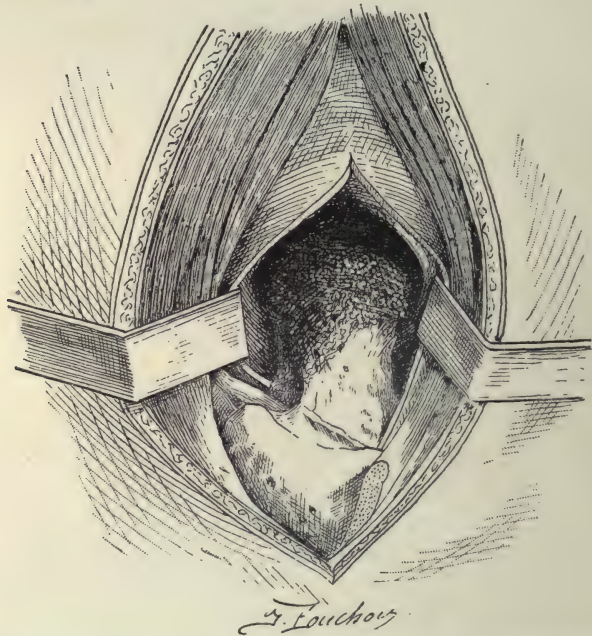


Fig. 492.—The upper part of the head and neck have been curretted, which is sometimes sufficient to ensure the drainage of the cavity.

5TH STEP.—*One clears away the head without dislocating the femur*. If the head is completely necrosed or in a soft condition, as is frequently the case in hip-joint disease, one removes it entirely with a curette, and lays bare the acetabulum. If the head of the femur is not necrosed or softened, one removes (with the chisel, forced in by the hand or the mallet) only the upper half of the head and neck, to ensure the

discharge of the pus ; we will find the half remaining extremely useful from an orthopædic point of view for preventing ulterior luxations.

6TH STEP.—*One makes the toilet with a curette, then with gauze, with which one rubs out the cotyloid cavity and neighbouring parts in order to remove all débris. Then one ensures hæmostasis.*

I ought to make special mention of **arrest of hæmorrhage** during or after the operation. You should see to this at every step.

It is necessary to proceed quickly—that is understood. But there is one thing of more importance than going quickly (the *tuto* before the *cito*) : it is **to see that the patient does not lose blood**, or loses as little as possible.

To ensure this, at each step of the operation, one secures the small vessels which may have been divided. As to the oozing from the surfaces of the soft parts and of the bone, one controls that with pads of gauze and with **firm pressure** upon the parts

for one, two, three, four, five minutes, until no more blood flows. Then one proceeds a step further, then one compresses again, and so on.

If you have been careful to prevent bleeding, the shock of the operation will be almost nil, even in an operation of half or three-quarters of an hour ; on the contrary, the shock will be grave, even after a short operation, if you have not controlled the bleeding well.

At the end of the operation, one makes a permanent arrest of hæmorrhage by pads placed in the bottom of the acetabulum

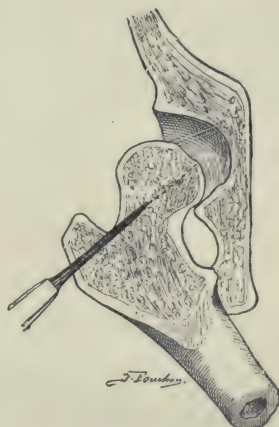


Fig. 493.—Resection of upper half of the trochanter, of the head and neck, by means of a chisel pushed in by the hand.

and by **energetic pressure**, which one keeps up for from **10 to 12 minutes** before proceeding to the dressing.

One or two large drainage tubes are inserted into the joint, and, if there is room, into the hole in the roof of the cotyloid cavity, enlarged if necessary; and one arranges round the drainage tube several pads of cotton wool for twenty-four hours. One sutures the two extremities of the wound.

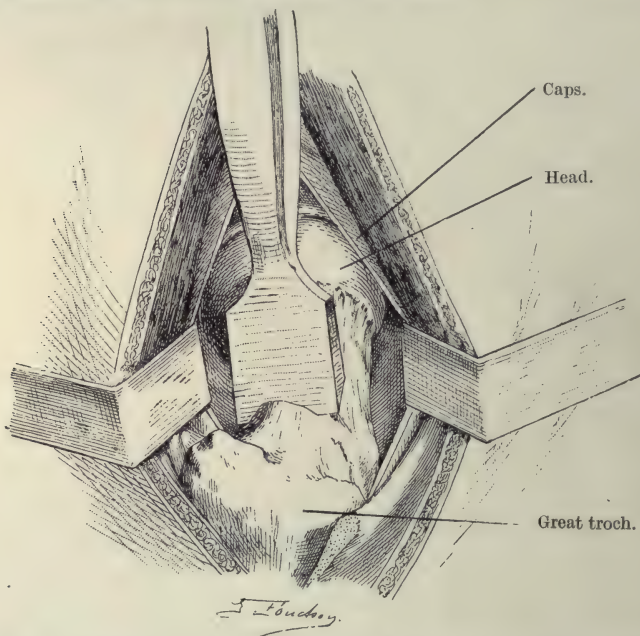


Fig. 494.—Complete removal of the head and neck. A cold chisel, worked by hand, divides the neck near its base and nearly perpendicularly to its own axis.

**7TH STEP.—The apparatus.**—One constructs over the dressing a *large plaster*, with the limb in a position of extension and slight abduction.

The next day, a square opening is cut out opposite to the region of the operation, following as a guide the line of the incision, and one removes the pads, having previously moistened them with oxygenated water. From that time



onwards the dressings are changed through the opening in the plaster.

The **technique** of resection **varies** a little if it is done for one of those cases of **hip-disease which go on indefinitely** in the form of dry caries (see 6th case), because there one looks

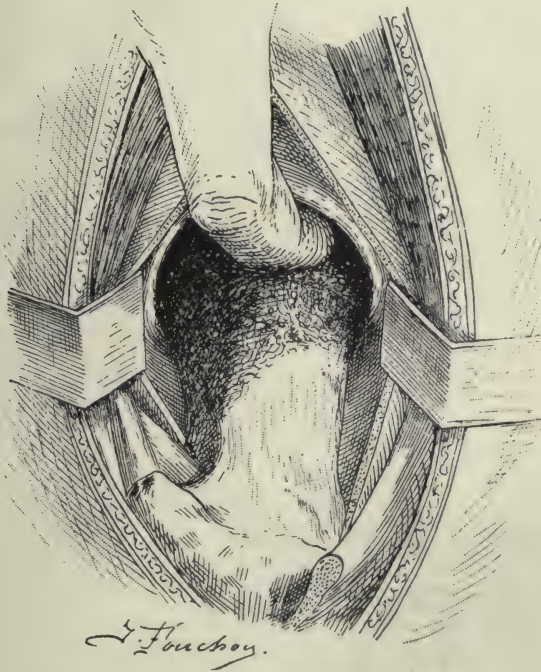


Fig. 495.—Exploration of the cotyloid cavity after curettage of the head.

for a complete and immediate cure of the disease, that is, union by first intention.

In this case, proceed as in resection of the knee-joint for white swelling not opened. Guard with more care than ever against any defect in asepsis. Remove by scraping all the suspected points of the two osseous extremities and of the surrounding soft tissues.

With regard to the bones, however, endeavour to retain, when removing the diseased points, a portion of the head, or, at least, of the neck, sufficient to provide a solid support for the limb on a level with the acetabulum.

One swabs the osseous surfaces with a strong solution of phenol (one to ten, for instance), and, for ten minutes, applies

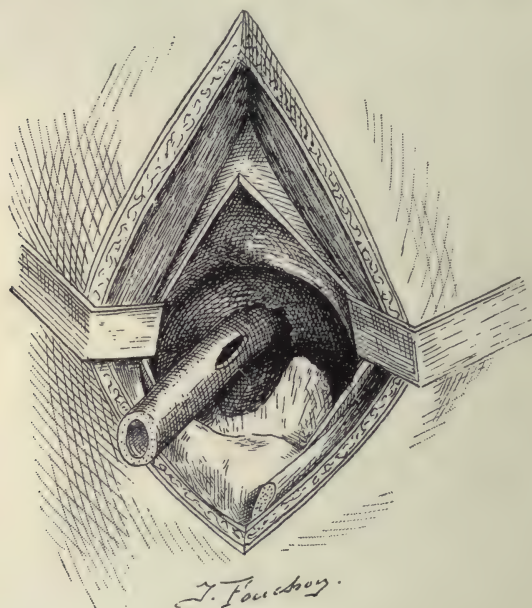


Fig. 496.—Drainage after curettage of the head and part of the neck of the femur. The drain passes into the perforation in the roof of the acetabulum.

pads with very energetic pressure on the osseous surfaces in order to ensure hæmostasis before closing the wound.

You will not close it completely, but will insert two small drains at the two extremities of the wound to prevent the formation of a hæmatoma, which so easily becomes infected. The drains are removed at the sixth or eighth day.

## CONVALESCENCE AFTER HIP-DISEASE

When do you place the child on his feet ?

As a general rule, when the tuberculous focus is extinct.

One may consider it as extinct 6 or 10 months after the disappearance of the clinical manifestations : granulations, puffiness, and pain, either spontaneous or on pressure.

Then<sup>1</sup> the child is placed on his feet ; at the beginning, with the support of two crutches (or, better still, held by the hands), then of two sticks (fig. 497), then of a single stick or, rather, of a **walking-stick held on the side opposite the affected hip.**

He will take walking exercise from ten o'clock in the morning till six o'clock in the evening.

He will walk 5 minutes every 2 hours for the first 2 months,<sup>2</sup> 5 minutes an hour for another 2 months, then 10 minutes an hour the 4 months following, after which he will have returned to the normal régime.



Fig. 497.—The sticks which advantageously take the place of crutches during convalescence, after hip-disease.

## Apparatus for Convalescence

1ST CASE.—If the hip has **preserved** the whole, or the greater part of its **movements**, a removable apparatus in

<sup>1</sup> From this time, he is permitted to sit up in bed for 1 or 2 hours a day ; 4 to 6 months later, he will be able to sit in an ordinary chair to take his meals (without the apparatus).

<sup>2</sup> In the interval of these exercises, the child will rest on a frame or on a couch.



celluloid is worn by the patient when he makes his first attempt at walking. The apparatus will be the small one stopping at the knee (fig. 498, 499), or, better, the large apparatus reaching to the foot, but jointed at the knee and ankle (fig. 500, 501). The patient will wear it only from 10 a.m.

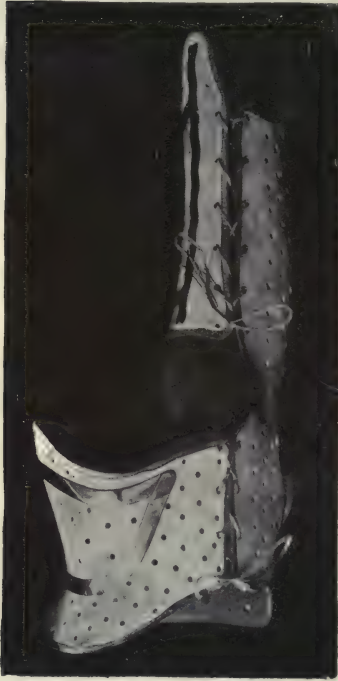


Fig. 498.—The small apparatus in celluloid padded and furnished with an armature of steel. Anterior aspect.



Fig. 499.—The same. Posterior aspect.

to 6 p.m. His hip will be free all the rest of the time as well as during the night.

Six to ten months later, one will commence to massage the legs gently, electrise them, bathe them; and one teaches the patient to walk properly, methodically, "planning" each step.

After a year, all apparatus may be put away.

2ND CASE.—If the patient has a **stiff hip** with a **tendency to deviation**, he must wear the apparatus constantly.

It should be a **small** irremovable plaster, or a large celluloid reaching from the waist to the foot, jointed at the knee and at the ankle.



Fig. 500.—The large apparatus in celluloid jointed at the knee and ankle. Anterior aspect.



Fig. 501.—The same. Posterior aspect.

For how long is the apparatus to be worn ?

You will leave on the apparatus **until the hip has no tendency to deviate**, which result is often not attained until two years or even longer, after standing up has been first allowed.

When you judge that the time has arrived to leave off the

apparatus, you leave it off gradually, first at night, then part of the day, and you verify very exactly every eight days that there has been no movement, that is, that there is no return of adduction of the knee nor any lumbar hollowing. If you perceive the least deviation, replace the apparatus or, at least, ensure during the night, by the help of Velpeau bandages, attitudes contrary to those which the limb has a tendency to assume.

You will combat adduction, flexion, rotation, in the way mentioned in Chap. XIV. (*Congenital Luxation*).

And even in the case where nothing has yielded, apply slight extension during the night, as a preventive measure, so that the limb keeps the position and the length you wish it to retain. Coxalgic children have need, after the cure of the tuberculosis, of being looked after by the surgeon for one or even several years, without which they very often again become gradually deformed. You have cured a child without deviation, with no lameness or nearly none; the parents think it is no longer necessary for you to see him, and then, after one, two or three years, a deviation of the hip and a marked shortening have recurred, causing a very unsightly lameness.

Do not give up these children because they have given you up too soon. Put them back under treatment and redress the deviation, in the way we have directed for vicious ankyloses in cured hip cases (see p. 443).

This unfortunate contingency will not occur if you remember to urge the parents to show the child to you after the apparatus has been left off, at least every 3 or 4 months for several years.

#### Orthopædic Boots

A shortening will often remain,<sup>1</sup> in spite of everything.<sup>2</sup>

If that amounts to less than 2 cm. it is negligible; the child

<sup>1</sup> Particularly in hip-disease with abscess, the tuberculosis having, in these more serious cases, deeply eroded and sometimes destroyed the head of the femur and the roof of the acetabulum.

<sup>2</sup> Unless you have made early articular injections.



will walk well, without even the need of a raised boot (provided the position is good and the hip well united). But if the shorten-



Fig. 502.—To take the measurements for a special heel. The patient is placed upright. The iliac spines at the same level; one places some plaster under the sole of the foot which does not touch the ground.



Fig. 503.—The foot resting on the plaster heel is covered with a stocking, the mould is made over the whole; one sees the band of zinc over which will be made the incision to take off the negative mould.



Fig. 504.—Boot for the affected side. Foot provided with special heel.



Fig. 505.—Sound side.

ing attains or exceeds 3 cm. supply a special heel, not equal to the height of the total shortening, but only half that. The boot should be supple to preserve the easy movements of the foot.

### Relapses and Recurrences<sup>1</sup>

In stating the precautions to take and the care to be given to patients just allowed to stand again and during convalescence, we have virtually indicated the best means of avoiding relapses, that is the return of the tuberculosis.

We ought to add some precautions of a general nature, meaning by that, that one must not be in a hurry to send back a child to Paris or to any great city, or to the poor surroundings where he was taken ill.

One must keep him by the sea or in the country, and attend to his diet and to his hygiene.

Keep him from every possible contagion.

How many cases of cured hip-disease have broken down when prematurely sent back to Paris !

Do not forget that cured hip-disease is an old tuberculosis, and the subject of it ought, on this account, to follow a severe course of hygiene, for several years more.

Thanks to good supervision, one will avoid relapse, or, at least, one will render it as rare as is humanly possible ; for one must admit that a **debilitating malady** which has unfortunately, appeared a short time after the cure—influenza, diphtheria, mumps, etc., or a violent **traumatism** over the hip, may precipitate a relapse, whatever may have been done up to this moment.

Parents ought to flee from all foci of contagion and preserve their children with the greatest care from all kinds of shocks.

**What to do in the case of a patient with hip-disease cured for one or two years, who suffers again in the region of the joint ?**

Assure yourself first of all that it is a question here of a true relapse and not of some passing pains due to a **simple sprain**—coxalgiques assuredly being liable (as much or even more than any one else) to a sprain of the hip after a blow or some

<sup>1</sup> What we say here of recurrences in hip-disease is applicable to recurrences of other osteo-articular tuberculoses.

exaggerated fatigue—not leading inevitably to a return of the tuberculosis.

In case of doubt, always place the child at rest for two weeks. If all pain disappears the same day, replace the child on his feet after those two weeks and send him back again to his ordinary life, but little by little, watching over him very closely, of course.

On the other hand, if the pains reappear as soon as he is placed on his feet, or if, at the outset, he has been taken with acute pains, muscular contractures in the whole of the region, or with nocturnal pains, or again, if there exist granulations appreciable on palpation, you will conclude it is a **true relapse** and will submit the child to the same treatment he underwent at his first attack.

Let us mention that the appearance without any pain of a periarticular **abscess**, two, three, four years after the child has been sent back to normal life, is **not always the sign** of a **relapse** of osteo-arthritis. It is a question very often of an old erratic bacillary nodule, of a tuberculoma of the soft parts, having lost for a long time all communication with the hip, which could have been reabsorbed and remained permanently ignored, but which, instead of that, has softened and produced the abscess of which we speak. In a word, it is an idiopathic abscess of the soft tissues, rather than an abscess by gravitation coming from the joint. You will puncture it and inject it, and you will be able to send back the child almost immediately (after a month or two) to his ordinary life.

## APPENDIX TO CHAPTER IV

### On the Results of our Treatment of Hip-Disease

1st. **Specimen of the result usually obtained in cases of recent hip-disease** (see fig. 506 and 507).

The case here illustrated is that of a little boy, Pierre R., of Paris, whom we treated at Berck for a left coxitis of between two and three months' standing.



The diagnosis had been made by my master, M. Jalaguier, who had commenced the treatment in Paris, before sending the child to Berck.

At Berck, the little patient followed the treatment given in this book for hip-disease of the first variety. At the end of 14 months, he was allowed to get up and begin to walk. Here are the photographs taken three years later.



Fig. 506.—Child cured of left hip-disease, Pierre R., of Paris, who was sent to Berck by my master, M. Jalaguier.



Fig. 507.—The same. One sees that he has recovered the whole of his movements. He is able to flex his thigh at an acute angle.

*These two photographs were taken three years after cure.*

The first shows that the child is quite straight (fig. 506). No hollowing, no deformity, no shortening. The second shows that he has recovered the whole of his movements.

After that, one will not be surprised that the child walks to-day without a shadow of a lameness. He is a normal child. And similar results are not the exception, they are the rule in hip-disease

taken at the beginning and well treated. We can recall a good number of our old cases of hip-disease who have been able to go through their military training.

2nd. **Specimen** of the **results** obtained in **old** or **grave** cases of **hip-disease**.



Fig. 508.—Left hip-disease dating back four years, of grave character, and still in active progress. Severe pains, two abscesses, vicious ankylosis. The child unable to move. Such was his condition on arrival at Berck.



Fig. 508a.—The same child three years later (the abscess has been dried up and the deviation obliterated in several sittings, by stages). See the text for details of treatment.

The four figures (508 to 510) represent a boy of 13 years of age (A. de N. of Lisbon) who came to us at Berck in 1899, with a left hip-joint disease of malignant character dating from about 4 years and still in active progress; the child complained of very severe pains and presented two large abscesses, one on the buttock, the other in the middle part of the thigh, but not yet opened, fortunately.

There was impossibility of movement without crutches, on account of the pain, and of a very marked deviation of the affected thigh, which was flexed at nearly a right angle,<sup>1</sup> with adduction and internal rotation.

General condition very indifferent, child pale and miserable.

**Treatment.**—Complete repose in the recumbent position, on

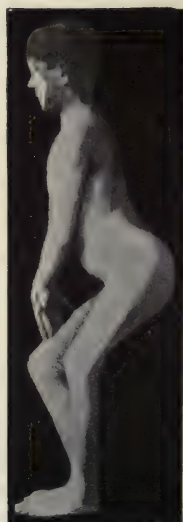


Fig. 509.—The same child seen in profile (on his arrival at Berck).



Fig. 510.—The same, three years after our treatment. Observe the straightening. The good attitude has been maintained for the last seven years.

a frame. We commenced by treating the abscesses—punctures and injections—without taking notice of the hip-joint disease. At the end of three months, the abscesses were dried up and at the same time the general condition was greatly improved. At that

<sup>1</sup> If the thigh appears, in fig. 508, much less flexed, it is because the lumbar hollow is not obliterated, but the flexion attained 80° or 90° when one took the precaution of obliterating the lumbar arch (see p. 481, fig. 508).



moment we commenced orthopædic treatment, that is, the correction of the vicious ankylosis, proceeding gently, without chloroform, and by stages, in the following way: the trunk of the child being held by two assistants, we made slight traction of about 10 or 15 kilograms, on the foot and the leg, and after 2 or 3 minutes of this traction, having obtained from  $10^{\circ}$  to  $15^{\circ}$  of correction, we stopped there. Handing over the traction to an assistant, we plastered the child in this slightly corrected position (large plaster going from the waist to the toes).

A fortnight later, a second correction (again without chloroform) of  $10^{\circ}$  to  $15^{\circ}$ , and a second plaster, and so on; every two weeks a new short sitting for correction—always gentle, so as not to distress at all the child, who bore these very small interferences admirably.

At the end of three months three-fourths of the correction was obtained. To complete the correction we preferred to have recourse to chloroform and perform a tenotomy of the adductors. This very small operation, which lasted barely 5 minutes, gave us not only the complete correction, but even a hyper-correction of from  $35^{\circ}$  to  $40^{\circ}$ . This time we left the plaster in position for four months. Then a new large plaster for three months, with a smaller abduction ( $25^{\circ}$  to  $30^{\circ}$ ). After that a final plaster, which stopped at the knee, in an abduction of  $20^{\circ}$  only. For one year more, the child wore small plasters; and then for nearly eight months a celluloid apparatus, which makes a duration of about three years for the whole of the treatment. But look at the result obtained.

The child actually walks without apparent lameness, and this slowly obtained cure has been perfectly maintained for the last seven years.

One can, with a treatment well conceived and well carried out, obtain results in every way as satisfactory in the immense majority of cases of grave and far advanced hip-disease.

## CHAPTER VII

### WHITE SWELLINGS (TUBERCULOUS ARTHRITIS)

#### I.—*Diagnosis of tuberculous arthritis at the onset.*

WE do not speak of the disease when the diagnosis obtrudes itself, but at its very commencement.

You are consulted about a patient who experiences in one of his limbs a sense of fatigue or a pain (sometimes only at night), or even simply a functional inconvenience, which may be only intermittent. Never neglect to examine, completely nude in such cases, the regions of the joints of the suspected member, always comparing them with the same regions on the opposite side. Find out :

1st. If there exist **pain on pressure** over the articular extremities in the segment to which the patient or his friends draw your attention (fig. 511).

2nd. If there exist already a commencing deviation, and in default of an apparent deviation, a **limitation**, however slight, of the movements of the articulation.

With these two signs you will be able to assert that there is "**something wrong**" in the joint (fig. 512, 513, 514, 515).

How will you know that this "something" is tuberculous ?

1st. *By the history.* If the pain and loss of power have supervened without appreciable cause, without a distinct injury, without

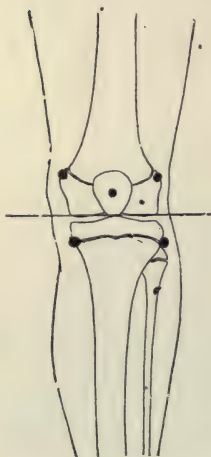


Fig. 511.—White swelling of the knee. Look for pain. The painful points (on pressure with the index finger) may be found either opposite the epiphysial cartilages or over the interline.

rheumatism, without blennorrhagia, without the antecedents of



Fig. 512.—*Limitation of movement.*—The patient lying on his face. On the right (affected) side, flexion of the knee is very limited ; on the left (sound) side flexion is normal.

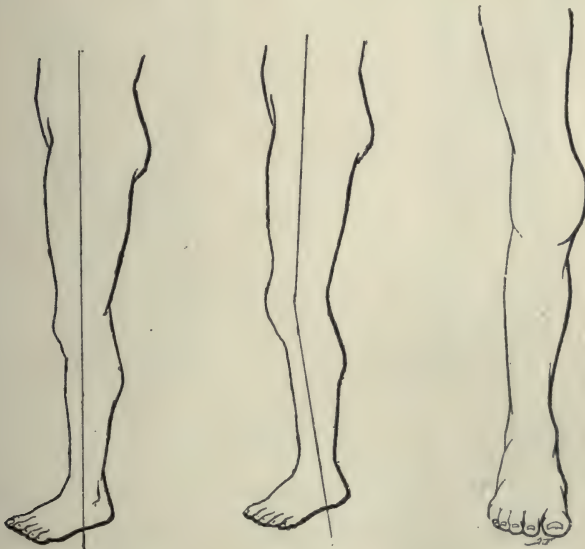


Fig. 513.

Fig. 514.

Fig. 515.

Fig. 513.—*Limitation of movement.*—A normal knee-joint : Complete extension is possible.

Fig. 514.—A diseased knee-joint : Complete extension is impossible ; it remains at a slight degree of flexion.

Fig. 515.—Front view : Globular knee. One notes at the same time a slight degree of genu valgum.

scarlatina or of hereditary syphilis, you should think of a tuberculous arthritis, especially if you are dealing with a delicate child, or one



recovering from a debilitating disease, an eruptive fever—measles, whooping cough, etc.

2nd. *By the direct signs.* If the patient has no fever (or only a few tenths of a degree); if, on palpation of the accessible parts of the synovial membrane, you find thickenings (fig. 516, 517), irregular bulgings of the synovial sac, a pulpy consistence or



Fig. 516.—Normal knee. The osseous prominences and the muscles in relief (normal condition).



Fig. 517.—Diseased knee. The osseous and muscular prominences have disappeared owing to swelling of the joint.

pseudo-fluctuation; if there exist an atrophy of the muscles contrasting with thickening of the skin when pinched (fig. 343, p. 355).

3rd. *By the positive ophthalmo-reaction*, the value of which seems to me to be real without being pathognomonic.

In cases where you still have some doubt, have the courage to **reserve your diagnosis**; ask to see the patient again, meanwhile keeping him under observation.

If you think the case is one of sprain, massage it; if rheumatism, prescribe salicylate of soda; if simple hydrarthrosis,

puncture it and apply pressure ; if hereditary syphilis, adopt the specific treatment.

When, in spite of these different treatments the symptoms still persist for several weeks, namely, pain on pressure over the ends of the bones, limitation of movements, functional trouble, thickening of the synovial membrane, then conclude that there is a tuberculous arthritis and commence the treatment appropriate to that condition.

## II.—*Prognosis of white swelling according to the variety and according to the treatment*

1st. **Will it be cured ?**—Yes ; if the patient lives by the sea, or in the country, and if you do not open or allow to be opened the tuberculous focus in the joint.

2nd. **How will it be cured ?**—It is always possible to preserve, or restore to the patient, a limb in good position—strong and useful.

As to the movements, that is another matter ; they depend on the joint involved, on the gravity of the disease, on the age of the patient, and not only on the treatment adopted. We shall see, in studying white swellings in particular (see p. 508), what you can safely promise to mobility in each variety of the condition.

3rd. **When will it be cured ?**—This depends chiefly upon the treatment adopted. In a year, with the intra-articular injections ; in 3, 4, 5, or 6 years, with the conservative treatment without injection ; in 3 or 4 months, with a very successful resection. So much for a closed white swelling (with or without effusion). But, if it happens to be a fistulous white swelling, it is impossible to be precise as to the duration of the disease (perhaps, however, one may be permitted to say a year and a half on an average with the conservative treatment here indicated and in surroundings such as those of Berck). (See the observations on white swellings with fistulæ cured, in our "*Traité des tumeurs blanches*," Masson, 1906.)

## TREATMENT OF WHITE SWELLINGS

### FIRST PART.—GENERAL REMARKS APPLICABLE TO ALL WHITE SWELLINGS

We ought to make a distinction between the orthopædic treatment and the treatment of the tuberculous focus.

## A.—ORTHOPÆDIC TREATMENT

## 1st. WHITE SWELLING SIMPLE AND RECENT.

(Little or no swelling, without pain and **without deviation.**)

In *hospital practice*, and in children of the working class, you at once apply a plaster (a circular plaster extending up to the neighbouring articulations).

In *private cases*, you may equally well use a plaster; nevertheless it is better, **in these cases** and in **this class** of people, where you **always** look for a cure with mobility of the



Fig. 518.—White swelling of right knee with marked deviation.

**joint**, not to apply a plaster, provided the joint affected is kept at rest.

Prohibition of walking and rest in the sitting position with the legs stretched out, if the lower limb is affected, suffice.

The arm in a sling with liberty to walk about, if the upper limb is concerned.

The joint in both cases should be protected with a light protective dressing (cotton wool and Velpeau bandages).

## 2nd. WHITE SWELLING DISTINCTLY SWOLLEN OR PAINFUL.

Here, in private as in hospital practice, you immediately apply a plaster which *includes both the neighbouring joints*, so



as to ensure more certainly the immobility of the affected joint.

3rd. WHITE SWELLING WITH DEVIATION (fig. 518).

The indication is, first, to correct the deviation: then, to preserve the correction with the large plaster.

Be prompted by what we have already said (see Hip-joint Disease, Chap. VI.) as to straightening tuberculous deviations.

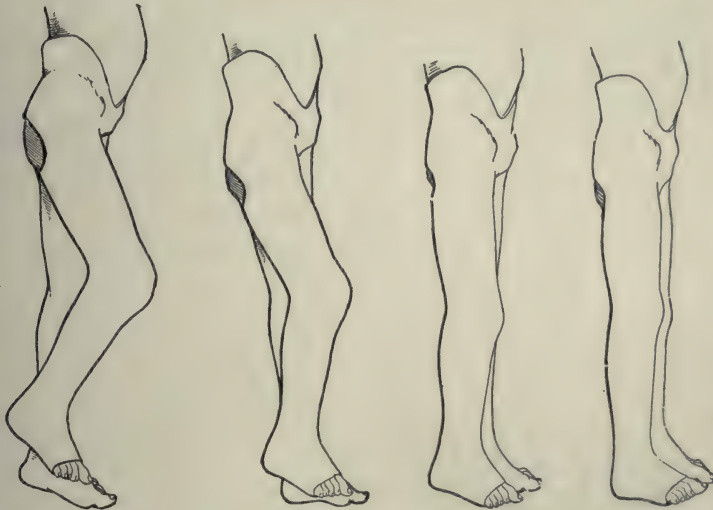


Fig. 519.

Fig. 520.

Fig. 521.

Fig. 522.

Fig. 519-522.—Correction of a deviation of the knee by successive stages.

We ought, as in hip-disease, to distinguish **two varieties of faulty position.**

1st. **Those at the onset** or during the acute period of the disease when the tuberculosis is most virulent, and **demands the greatest precautions.**

2nd. Slight deformities *nearly always painless*, **at the end**, or during the period of resolution, when the tuberculosis is nearly extinct or even quite extinct. Here **manipulations of a vigorous kind are permissible.**

1ST METHOD.—*Without chloroform. Straightening by stages.*

A new plaster every fortnight.

One gains a few degrees each time, without causing pain, as one uses only a little traction or a little pressure, which can be effected even after the last plastered strip has been applied.

You appeal to the courage of reasonable patients, who will tell you freely how far you may go with traction without arousing real pain.

One attains in this way, in the space of two or three months, surprising corrections and even complete ones, without making any change in the patient's mode of life.

Fig. 519 to 522 represent the correction by stages, made by a series of plaster apparatus, without chloroform.

2ND METHOD.—*Correction with the help of chloroform*

An apparatus every 15 days, in the way we have just described, is, however, too much to expect, for instance, of a very busy surgeon in hospital practice. It is simpler, for example, little as one may be familiar with anæsthesia, to give a few drops of chloroform and finish at one or two sittings at the most.

Indeed, by the help of chloroform, one accomplishes almost immediately, without danger, without violence, the desired correction, which is at once secured by the application of a plastered apparatus. The whole affair occupies from 5 to 10 minutes and then three months of rest and perfect comfort is assured for the patient.

One sitting suffices for recent vicious deviations. The older deviations require generally two or sometimes three. A general rule, which it is important not to forget, is to avoid all useless or violent manipulation.

We may add that correction is always attained—or nearly always—by simple orthopædic manipulations, by a simple straightening, without having recourse to an osteotomy or even to a tenotomy.

## B.—TREATMENT OF THE TUBERCULOUS FOCUS

What shall we do to cure the tuberculous focus ?

Adopt a treatment consisting of rest of the joint and its immobilisation by a plaster apparatus.

Is that all ?

It is all when one is dealing with a focus in Pott's disease. But if, in Pott's disease without perceptible abscess, its site so far removed from the lesions preventing us doing more, it does not follow that our course will be the same in the case of articulations so easily accessible as the knee, the foot, the shoulder, the elbow or the wrist.<sup>1</sup>

Here we may choose between the three<sup>2</sup> following treatments :—

1st. Mere *rest* in a *plaster* ;

2nd. Removal of the articular focus, that is, by *resection* ;

3rd. Modifying intra-articular *injections*.

Of these three treatments which is the best ?

To reply to this question, let us go back to the tuberculous type of the lesion, which is Cold Abscess.

In fact, is not **white swelling**, in reality, merely a **cold abscess of an articulation** ? (fig. 523 to 527).

It is evidently so, if it is a question of white swelling with effusion. But it is also true of white swelling not yet softened, although the liquid contents of a cold abscess are wanting ; on the other hand, we have the virtual cavity and especially the

<sup>1</sup> From this point of view, hip-disease stands halfway between Pott's disease and white swellings of the different joints. The hip is not so easily accessible ; nevertheless you have seen that it can be reached by following the method given on p. 388.

<sup>2</sup> **The method of de Bier in white swellings ?** I do not know this method well enough to be able to express a definite opinion as to its utility. But what I can say is that, in some cases well known to me, where it has been applied for **tuberculous arthritis**, it has produced an unmistakable **aggravation**. Even amputation has been necessary in three cases treated thus ; these patients would certainly have been cured by the treatment we advise.



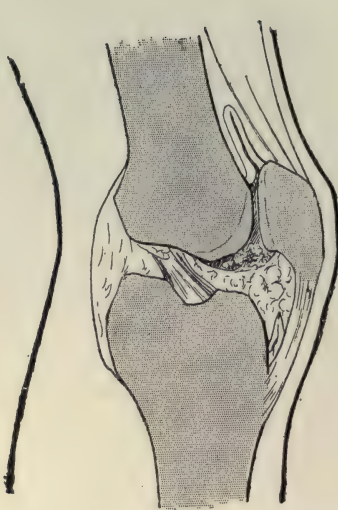


Fig. 523.

(See description of Fig. 527.)



Fig. 524.



Fig. 525.

(See description of Fig. 527.)

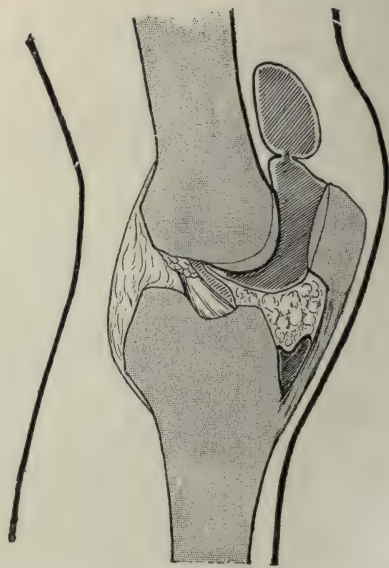


Fig. 526.

characteristic element, the only essential one of cold abscess, namely, the proliferating and fungating wall.

It follows that what has been recognised to be good for cold abscess will without doubt be good for accessible white swellings. And, if there is one thing universally admitted



Fig. 527.—Description of figs. 523 to 527.—*Comparison of suppurated white swelling with cold abscess*: the figures enable one to realise that the synovial membrane (the cul-de-sac under the triceps) may become separated from the rest of the articular cavity by formation of adhesions and form an abscess. The abscess is cured, like all cold abscesses, by punctures and injections. The articular pouch should be cured logically by the same method since it is of identical nature with the part which has been separated from it.

in cases of cold abscesses, it is the beneficial revolution which has taken place in their treatment now one *punctures* and *injects* them; it is the **indisputable superiority of punctures and injections over purely conservative treatment** (rest and compression)—which is *too uncertain* and *too long*—and **over surgical operation** which rarely

*cures, often aggravates* (by leaving a fistula) and *always mutilates*<sup>1</sup> (fig. 528).

It is exactly the same in white swellings, where the treatment by punctures and injections is infinitely superior to the two others; it is efficacious, benign, easy of application, and relatively rapid; it cures in a few months, 8 to 12, giving

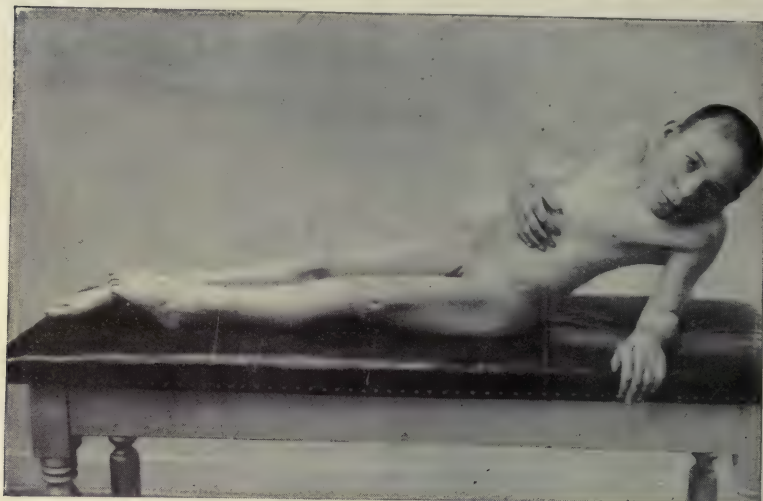


Fig. 528.—An example of the poor result of a resection of the knee: after 5 years, there is a shortening of 11 cm. (!) as well as a pseudarthrosis.

superior orthopædic results to those of the two other methods.<sup>2</sup>

I do not say that there do not exist some cases of dry or

<sup>1</sup> If it is true when one operates on cold abscess, what is to be said of the mutilation left by resections in childhood? They inevitably leave a lesion of the articular cartilages, hence a shortening which will increase later on. On this account typical resections ought to be condemned without appeal, in childhood.

<sup>2</sup> Injections, by advancing the date of cure, allow us to considerably shorten the period of severe immobilisation in plaster; and thus joint movements have not time to be lost, or, if lost, they may return, whilst surgeons who do not make injections are obliged to keep to the plaster for three long years, the results for their patients inevitably being ankylosis, even after mild arthritis.



pulpy white swellings calling for either conservative treatment (recent or mild arthritis not fungating, the child not pressed for time and able to wait for years) or resection (white swelling of knee completely and easily accessible in an adult working man to whom time means money). **But apart from these special and exceptional indications**, to which we will return, the treatment by **injections** ought to be the **regular treatment** of tuberculous arthritis.

The method of cure of white swellings *with effusion*, by the method of injection, is easy to comprehend; but *how can injections cure a dry or fungating white swelling?*

In this way: By making the injections into the large articular cavity and not round about it, we reach the granulations on the internal surface of the synovial membrane and over the osseous surfaces, that is, where they really are.

The liquid, brought in contact with the granulations, modifies them in two ways, either sclerosing them or softening them.

Be the transformation fibrous or liquefying, the cure will be thus promoted, hastened, assured; if there is liquefaction, that is to say, intra-articular effusion artificially brought about, one combines the punctures with the injections, as in the case where effusion already exists.

We have liquids which give us sclerosis: that which gives the best result is creosoted oil with iodoform (the formula is given at p. 110); others which give us solution of the granulations, the best is emulsion of camphorated naphthol in glycerine ( $\frac{1}{6}$  camphorated naphthol to  $\frac{5}{6}$  glycerine; see p. 110, for the dose to be injected).

I call those which produce **sclerosis**, *injections of the dry type*; when they bring about **liquefaction**, *injections of the liquid type*. In a general way, it is better to liquefy than to sclerose.

One cures better and more certainly by liquefying all the tuberculous products, so as to be able to expel them afterwards by puncture, than by transforming them *in situ* by sclerosis.

Bacteriology enabled us to foresee this ; clinical work has demonstrated it. One will adopt then—as a general rule—injections of **camphorated naphthol** in glycerine rather than injections of creosoted oil with iodoform. It is a necessity in the ever so slightly **grave forms** of articular tuberculosis.

As to the **benign forms**, the **injections of creosoted oil with iodoform may be sufficient**, and, as they cause, as one can imagine, less inflammatory reaction than the other, one may give **to children of the better classes**, whose parents are nervous, injections of the dry type. One cures three-fourths of the cases in this way. When the worst comes to the worst, in those who after 5 or 6 months are not cured, you will make a second series of injections, this time of the liquid type.

To recapitulate whether white swellings are dry or suppurating, the treatment by injections, if it is well done, cures more than 19 out of 20 of the patients in the space of from 8 to 12 months, with, very often, the preservation of the functions of the joints.

The preservation of mobility is obtained, especially in private patients whom we are able to follow up and who come to us before the period of osseous destruction has set in.

#### STATISTICS

To give you an idea of the results of injections in tuberculous arthritis, we cannot do better than place before you here the entire statistics of white swellings treated for 10 years, from <sup>1</sup> January, 1895, to January, 1905, in the hospital Cazin at Berck, where all white swellings without exception are treated by intra-articular injections.

The number of these white swellings amounted to 311 (176 of

<sup>1</sup> These statistics of the hospital Cazin are the most striking of all those I am able to quote :

1st. Because in the hospital Cazin, *all* the swellings have been treated by injection.

2nd. Because the method has been followed with the utmost strictness.

the knee, 77 of the ankle, 18 of other articulations of the foot, 8 of shoulders, 15 of elbows, 17 of the wrist or other articulations of the hand).

All these children were cured within a year, by a series of 12 injections, except 7 of them who were cured after 2 or 3 years only, and in whom a new series of injections had to be made (even a third series in 4 of them). There existed, undoubtedly, several independent foci which had not all been reached by the first series of injections.

Not one death, no amputation, nor even a resection. We have not performed in that hospital, for the last ten years, more than three resections of the knee *with a purely orthopædic object in view*.

These children have been cured, as we said, in an average of 8 or 12 months, namely, 2 months for the injections, 3 months of compression and rest after the injections, and, finally, from 4 to 6 months' supervision, still at rest, to be assured of the cure, before returning to the use of the limb.

From the point of view of value of result, not only have we obtained limbs of normal length, figure and stability, but in nine-tenths of these cases, the mobility has been preserved, but not however in the knee; we must admit that in the hospitals we do nothing to preserve suppleness of the knee, because children of the working class, with little or no supervision afterwards, have more need for the time being of a strong limb which remains well cured, than a supple joint, which, on account of its very suppleness, is exposed to sprains and relapses.

It happens also very often, after a year and a half or two years of waiting, that mobility in the knee returns of its own accord.

#### TECHNIQUE OF TREATMENT OF WHITE SWELLINGS BY INTRA-ARTICULAR INJECTIONS

##### (a) White Swellings with Effusion

Here is the scheme of treatment you should carry out. You apply a plaster, with an opening for the injections. After that the treatment is identical with that of ordinary cold abscess (see Chap. III., *Treatment of Suppurated Tuberculoses*); the same liquids of the same strength are injected into the articular cavity. You will find in the second part of this chapter, the proper place for injecting each articulation.



Thus one makes from 7 to 8 punctures with as many injections at the rate of one every 6 or 8 days—which extends over about two months.

After that, one makes methodical pressure over the region with squares of cotton wool introduced through the opening in the plaster and supported by a soft bandage, a compression equal to that required for a gibbosity (see Chap. V.). You leave the limb at rest in the plaster apparatus for three or four months longer. The examination made at the end of that time shows that the articulation is free from pain.<sup>1</sup>

From this time, the joint is left without an apparatus; but it still requires rest for several months (rest, for the lower limb on a frame; in a sling for the upper limb). It is during these few months of rest that you usually see the movements return *spontaneously*, merely as a result of the joint being left at liberty and without any direct treatment; at the most you will help it by a few baths (2 or 3 every week).

You should not consider the child cured before 6 or 7 months after the articular extremities have been freed from pain on pressure.

This makes for the entire treatment, on an average, from 8 to 12 months.

#### TUBERCULOUS HYDRARTHROSIS

If instead of pus in the joint there is only a sero-fibrinous effusion (do not forget that half of the hydrarthroses of childhood, in particular those which continue beyond a few weeks, are of tuberculous nature), one will carry out the same treatment as for distinctly purulent effusions, with this difference, that five or six punctures and injections, followed by two

<sup>1</sup> If, very unusually, three or four months after the injections, pain and pulpiness still persist, it would be necessary for you to make a second, and if need be, a third series of injections, leaving three or four months' interval between the series. This necessity for the second series of injections has occurred to us three times in a hundred cases, and that of a third series once in a hundred only.

punctures without injections, suffice generally, in the case of hydrarthrosis, to ensure the cure.

### (b) Dry White Swelling

One applies here also a fenestrated plaster for 5 or 6 months. We know that here we may seek for either sclerosis or liquefaction of the granulations.

Not only the liquids injected, but also the number of sittings and the intervals between them are different in the two cases.

1st. To OBTAIN SCLEROSIS, one injects from 2 to 12 grammes, according to the age of the subject and the capacity of the joint, of creosoted oil with iodoform, and one will make only one injection weekly (without punctures, seeing there is nothing to evacuate). One ceases after eight or ten injections.

2nd. To EFFECT THE LIQUEFACTION OF THE GRANULATIONS, one injects the mixture of naphthol and glycerine <sup>1</sup> (see p. 161), giving an *injection* daily until the articular effusion is brought about.

That is produced towards the fourth day (sometimes on the third, sometimes only on the fifth or sixth).

As soon as fluid is apparent, one commences with a puncture and one finishes with an injection, following the technique already studied for white swellings with effusion present at the onset.

<sup>1</sup> **Alone, camphorated naphthol** may not give us this **liquefaction** with certainty. Gaiacol, or thymol or camphorated salol is of **incomparably less value** (I have experimented with them, also, for a long time).

But camphorated naphthol needs to be employed with considerable caution, that is, in a certain dose and in a fixed form.

*The dose* is from 6 to 30 drops for each injection according as you are treating a child or an adult.

*The form* in which it should be used: **never alone**, always intimately mixed with glycerine in the proportion of 1 gramme of camphorated naphthol to 5 grammes of glycerine. Refer to p. 120 and to fig. 107.

**Under this form** and in this dose, **camphorated naphthol** is not only **inoffensive**, but is just as **efficacious** as pure camphorated naphthol—that is, it produces on the fourth or fifth day the articular effusion sought for. (See the thesis of Dr. H. Saint-Beat, 1905.)

From this time, lengthen the intervals ; one only every five or six days, which gives the patient a rest, the daily injections at the commencement being fatiguing to him.

The treatment following the injections is the same as that given above.

### *The Reaction caused by the Injections*

Injections always cause some indisposition and a certain reaction ; that is true even with iodoform. You should warn the parents of it. The reaction is more noticeable with injections of naphthol, especially at the commencement, where they have to be repeated each day in order to produce the articular effusion.

It is not a question of an immediate reaction, which with our liquid is next to nothing, but of the **desired reaction**, the following day, and for some days afterwards, which is shown by the general and local phenomena of an acute or subacute inflammation. One observes a certain malaise, loss of appetite, sleeplessness, at the same time slight swelling, pain and heat, and occasionally some redness in the neighbourhood of the joint. The temperature reaches  $100^{\circ}$ ,  $101.5^{\circ}$ , and even sometimes  $102^{\circ}$ , with the doses we have mentioned.

If, then, after the first or second injection the temperature rises, it is a good sign, in this sense, that it marks the very near occurrence of effusion in the joint.

The pain and other symptoms, however, should not exceed a certain limit, and the temperature must not remain at, say,  $102^{\circ}$  beyond a few days.

It is **easy**, however, to **moderate the reaction** when too violent ; it suffices to suspend the injections for one or several days, or even to inject only half doses of the liquid.

Here is the right procedure : Provoke sufficient reaction to obtain the articular effusion, but not enough to cause excessive distress to the patient. One keeps it at the desired degree, about  $100^{\circ}$ , by increasing or diminishing the amount of liquid



injected, or by increasing the number of the injections or shortening the intervals between them.

The period of malaise comes to an end when the effusion is brought about, more especially as, from that moment, the object being gained, one can lengthen the intervals between the sittings.

(c) **Injections in White Swellings with Fistulæ**

The rule here is the same as in the case of tuberculous fistulæ in general (see pp. 165 and 212).

**It is only in non-infected fistulæ** that one uses modifying **injections** of camphorated naphthol with glycerine or creosoted oil with iodoform. One gives one injection daily for 10 days ; then pressure and rest for 3 or 4 weeks. If this series does not suffice for a cure, recommence in the manner described at pp. 168 and 175.

CHOICE OF TREATMENT ACCORDING TO THE CLINICAL  
VARIETY OF WHITE SWELLINGS

FIRST CASE.—**Dry or Pulp White Swellings (without  
Effusion)**

We said that intra-articular injections are our usual treatment for white swellings ; this is the treatment we apply always, and from the beginning, in hospital practice. In private work we do not adopt it, neither as a rule nor from the beginning, for reasons which you will easily understand. There are timorous parents, who are afraid, instinctively, without knowing why. One must be prepared for them.

As, moreover, it is indisputable that a tuberculous arthritis has many chances of being cured without injections, in a good environment, although the treatment may be five or six times longer, it is true, you may, after having warned the parents of this fact, keep to the purely conservative treatment, without intra-articular injections.

Leave the child at rest, as in the first variety of hip-joint

disease on a frame, without a plaster, with a simple cotton wool dressing. He lives by the sea, or at least in the country, for 2 or 3 years. We said that the parents in such cases are in no hurry.

As long as the joint is not plastered, there is no fear of ankylosis, or of too great atrophy of the limb.

After a few months of this regime, if the joint has become



Fig. 529.—Diseased knee-joint. Swelling of the joint. The patella is projected forwards.



Fig. 530.—Healthy knee-joint seen on its external surface.

practically painless on pressure, if the swelling has disappeared, if the position is still correct, we may expect a cure and we will continue the same treatment.

But if the white swelling is stationary and, still more, if it has progressed, if swelling, pain, or a deviation have appeared, there is proof that a cure will not be obtained without injections, or, at least, that it will not happen for long years. The duty of the surgeon is then to impress this upon the parents, so that they agree to allow the use of modifying injections.

Tell them that the injections will : 1st, ensure and hasten the cure ; 2nd, yield a better cure than the conservative treatment would do in a similar case.

This point settled, here is, recapitulated in a few words, the course to be followed in cases of dry or pulpy white swellings.

The three following clinical varieties must be distinguished :—

(a) **White Swellings, Benign and Recent.**—Practically there is no pulpiness, no deviation, no spontaneous pains (fig. 529, 530).

*When treating a private patient.*—If the parents are unwilling to have the injections given, place the joint at rest, with or without plaster, and wait.

If **you have entire liberty of action**, give, from the outset, **injections of creosoted oil with iodoform** after having put on a plaster to be worn as long as the injections are made, and for a few weeks afterwards.

If you see, after three or four months of waiting, that this is not sufficient, if pulpiness or pain on pressure persist, make injections of camphorated naphthol.

*When you are treating a hospital patient*, inject **camphorated naphthol** with glycerine from the outset (after the application of a plaster).

(b) **Pulpy and Severe White Swellings** with or without deviations, and

(c) **Old and Painful White Swellings**, *already of several years' standing and mistaken for chronic rheumatism.*

For these two varieties (b and c); from first seeing the patient, plaster apparatus, after correction of vicious position, if such exists; then, the next day or the day afterwards, **injections of camphorated naphthol.**

In these old white swellings, consisting probably of multiple independent foci, one must give similar and simultaneous injections at every point where a tuberculous focus is supposed to exist, and give, if need be, a second and a third series, at three or four months' interval the one from the other.



It must be understood, however, that in dealing with an adult workman, always pressed for time, and if you are a surgeon and very certain of your asepsis, you may at the outset, suggest resection,<sup>1</sup> because it would be a saving of time to the patient.

If you are not a surgeon, you may, even in this case, keep to the treatment by injections of the liquid type, repeated if necessary. They will succeed in the end, nine times out of ten, and the orthopædic cure so often obtained will be at least equal to that which resection would give—at the cost of a little patience and time, it is true (a year or a year and a half instead of from three to five months), without any risk to the patient; this cannot be said of resection, which very often leaves fistulæ, in which case the situation would be very noticeably aggravated by operation.

**SECOND CASE.—White Swellings with Effusion, Purulent or Sero-Fibrinous (Tuberculous Hydrarthrosis) (fig. 531)**

Here, invariably, in private or in hospital, in adult or in child, there is only **one rational treatment**: plaster, punctures and injections, either with creosoted oil and iodoform, or with camphorated naphthol and glycerine (see p. 110).

**THIRD CASE.—White Swellings with Fistulæ**

Read again what we have said (Chap. VI.) on fistulæ in hip-joint disease.

The treatment differs according as to whether the fistulæ are injected or not (see for this difference, p. 220).

In **non-infected fistulæ**, you will give injections, and the cure will be obtained, generally, in a few months.

In **infected fistulæ**, **no modifying injections** of iodoform or of camphorated naphthol are used.

<sup>1</sup> Or, better, after a series of injections (5 or 6, made in the space of a month), which will much attenuate the virulence of the tuberculosis and will ensure union by first intention.

At the most you will try syringing with solution of permanganate of potash or with very weak carbolised water.

You must confine yourself to a discreet therapeusis, simple asepsis, and good general treatment: you will need abundant patience, for the cure requires 1, 2 or 3 years. But at last the cure is obtained, at least in an ideal environment such as that of Berek.

So much for the case where there is no fever, or not much.

But it is not sufficient where there is fever.

Then you will have to drain, in order to overcome it.

If the fever persist in spite of drainage, in spite of arthrotomy (that is, an extensive opening of the articular cavity and removal of any sequestra you may find), and in spite of resection; or, again, if the viscera, liver or kidneys, show the least signs of degeneration, owing to infection extending from the peripheral focus; or if the patient is cachectic and the lungs are beginning to be tuberculosed, resign yourself to sacrificing the limb. It is a last resource which we do not possess in hip-disease. But you must not have recourse to it except in the last extremity, that is, when you are *morally certain that the life of the patient is in immediate danger and cannot be saved without amputation of the limb.*<sup>1</sup>

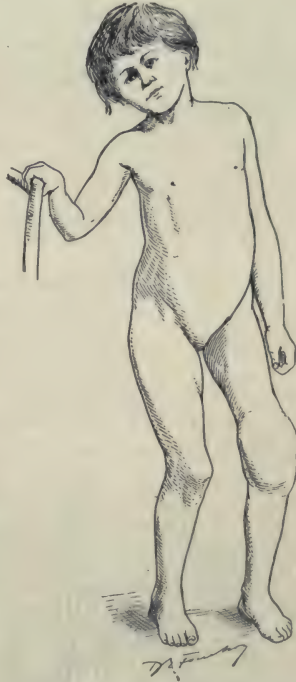


Fig. 531.—White swelling with effusion. The knee is very swollen; no osseous reliefs are apparent; fluctuation quite distinct.

<sup>1</sup> And, on the other hand, morally certain that amputation will save him, that is, that the intervention is not too late.

Nevertheless, amputation is sometimes proposed apart from the preceding indications, as in the case of a working man whom the necessities of life oblige to return to the unwholesome surroundings of a large town.

His fistula, more or less infected, without for the present endangering his life, has not, nevertheless, much chance of being cured, and incurs far too much risk of bringing about in the long run a generalisation of the tuberculosis. It would be better then to amputate.

If the lower limb is in question, one would not even attempt, as a preliminary, a very large resection, which would only cure the patient with a limb so shortened that it would be of less use to him than a good stump.<sup>1</sup>

#### FOURTH CASE.—**White Swellings Cured or Apparently Cured with Ankylosis**

Your course, in the presence of an ankylosis, will differ according as to whether it is accompanied by a deviation or not.

**Leave it alone if there is no deviation**, or, rather, you will only deal with the ankylosis by very simple methods: very gentle massages; the Baths of Barèges, Bourbonne, Aix, Dax, Salies, or Argelès-Gazost.<sup>2</sup>

On the other hand, if there is a **deviation** and the functions of the limb are seriously affected, you must **correct it**.

No surgical operation for this, not even a tenotomy, but **correction** by simple **orthopædic** movements with or without chloroform; by stages, one correction every five days, each partial correction being followed by the application of a plaster; three or four sittings suffice. By this method you will succeed,

<sup>1</sup> At Berck, I do not perform, on an average, one amputation a year, amongst many scores of fistulous white swellings in children or adults, whom I have under treatment; but the patients are not all able to come to Berck, nor wait two years for their cure. This means that you may be obliged, more often than the doctors of Berck, to perform the painful task of amputating.

<sup>2</sup> See "Argelès-Gazost from a Medical Point of View" by my old assistant, Dr. Bergunat.



because the ankylosis is hardly ever really complete, that is, osseous.

Never, or scarcely ever, will you need to perform osteotomy,<sup>1</sup> nor orthopædic resection.

As for me, I do not perform one per year on an average, although I treat annually a hundred ankyloses following white swellings. As soon as you have transformed the ankylosis with deviation into an **ankylosis in good position**, you will leave it alone and **do nothing to mobilise it.**<sup>2</sup>

There would be too few chances of restoring movement and too much risk of losing the good position of the limb in endeavouring to do this.

The cure of white swelling is achieved in good position. The patient will then have a very useful limb.

Be satisfied with this very creditable result, and take care not to spoil it, from the functional point of view, or even to re-awaken the disease in trying to restore the articular suppleness which has been lost.

If I endeavour to warn you, in the course of this book, of all that you can and ought to do, I endeavour also to point out that which you cannot, that which you ought not dare to do.

<sup>1</sup> Osteotomy, should it ever seem unavoidable to you, is easily and simply performed. See Chap. X. as to how it is done at the knee, the Supra-condylar Osteotomy of MacEwen.

<sup>2</sup> Doubtless, it is very different for a specialist quite familiar with such treatment, and practising in an orthopædic institution which is furnished with all the installations desirable (balneo-therapy, electro-therapy, mecano-therapy, etc.). Here one can have recourse not only to massage, but, in certain well-understood cases, to the mobilisation, discreet and prudent, active or passive, of stiffened joints.

Passive movements are sometimes effected by mathematically regulated machines, such as our arthromoteur, or by the hands of the surgeon. Occasionally even, in certain infinitely rare cases, one practises forced mobilisation of the ankylosis under chloroform, to bring back movements; after this the limb is immobilised for one or two weeks; then the mobility thus educed in the joint is developed by massage and passive manœuvres.

But these treatments are so special in nature, their results call for so much time and care, they have so few chances of success in the hands of the majority of practitioners, that I do not hesitate to formally advise you not to attempt them.

## II

## SECOND PART OF CHAPTER VII, OR THE TREATMENT OF EACH WHITE SWELLING IN PARTICULAR

What we have said in the first part of this chapter is applicable to all white swellings.

We must now pass in review the white swellings of different joints, in order to point out the peculiarities which each of them presents.

WHITE SWELLINGS OF THE KNEE<sup>1</sup>

White swelling of the knee is the most frequent of them all. It is the type of white swelling, which we have especially in view in our clinical and general therapeutic study of white swellings. We will add only a few points here.

1st. As to **Diagnosis** (fig. 532 to 539).

(a) I have no need to teach you how to find, by looking for the patellar "choc," the existence of an *effusion*.

(b) It is here especially that we have to distinguish *simple hydrarthrosis* from *tuberculous hydrarthrosis*.

If the *hydrarthrosis* continues for more than 6 or 8 weeks, in spite of puncture and pressure, it is, nearly always, *symptomatic* of a tuberculous arthritis.

In the presence of a double *hydrarthrosis*, without limitation of movements, one ought to think of *syphilis*, if there are any antecedents, and when in doubt, to follow the specific treatment (see Chap. XXI., *Syphilis of the Bones and Articulations*).

(c) In adolescents and in adults, an arthritis of the knee, which has appeared without apparent cause, is probably due to a *blennorrhagia* and one ought always to examine the patient with this in view.

2nd. As to **Prognosis**.

Refer to what we said at p. 487 on this.

<sup>1</sup> See the theses of : Dr. Dulac, 1898 ; Dr. Ch. Benoît, 1906 ; Dr. Cresson, of St. Petersburg, 1905.

One can restore a leg, straight, strong, and useful, to these patients, but not always the movements.

One must note that mobility is much more difficult to obtain in the knee than elsewhere.



Fig. 532.—To search for fungosities: Schema of the anatomy of the synovial membrane, which is seen tinted in grey behind the patella.

With the best treatment we succeed in scarcely more than half the cases in obtaining it.

Moreover, mobility is not always desirable for the patient, as you will see.



### The Functional Result to be looked for in the Knee

#### I. *In children or adults of the upper classes.*

You will look for cure *with* **preservation of movement** only when the white swelling is benign and recent, and when the position and suppleness are normal, or nearly normal.



Fig. 533.—The same seen in front (again tinted grey) exposed to view on each side of the patella.

You will succeed then in preserving the mobility, in three-quarters of the cases in children and in half of the cases in adults.

This is how you will do it: you will not leave the plaster on for more than 4 or 5 months, namely, 2 months while the injections are being used, and for 2 or 3 months after that; afterwards leave the knee free, with a simple bandage of Velpeau crêpe, but still at rest in the horizontal position for 5 or 6 months; that makes 10 to 12 months for the total duration of treatment.

Then you may allow patients to stand on their feet; let them walk with a large apparatus in celluloid reaching from the pelvis to the foot, but jointed at the hip and ankle. The apparatus is removed during the intervals between the walking exercises, and during the night. Remove it entirely after a year's use.

You **look for cure by ankylosis**, on the contrary, in all cases of rather old white swellings (dating back a year or more) and of grave character, with a markedly vicious position



Fig. 534.—*Searching for Fluctuation.*—1st step. Make the fluid move from the periphery to the centre by pressing over the synovial sac above and below the patella, with the two hands in the form of a horse-shoe.

(flexion of more than  $20^{\circ}$ , with subluxation outwards and backwards).

Try for it also *in all cases of the first group* where the move-



Fig. 535.—2nd step. Keeping up the pressure, one brings the hands together and with one of the index fingers, one taps on the patella as one touches the piano; in this way one obtains the **patellar "choc,"** the sign of the presence of fluid.

ments, having been preserved or recovered, the position becomes bad as soon as the patient is left without the apparatus or when he is noticeably lame or incapable of taking a long walk.



Fig. 536.



Fig. 537.



Fig. 538.

Fig. 536.—The first radiogram to the left of the reader (fig. 536) is that of the affected side. The second (fig. 537) that of the sound side. A child of six and a half years. Tuberculous arthritis of four months' standing. General tint brighter, the interline more narrow, epiphysial parts more developed over the affected knee.

Fig. 538.—White swelling of the knee, one and a half years standing (a child of seven years). The interline is blurred; the diaphyso-epiphysial angle of the tibia presents an anterior concavity.

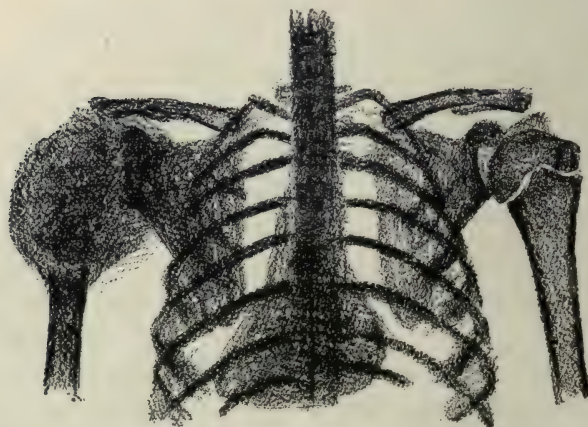


Fig. 539.—Osteo-sarcoma of shoulder (had been mistaken for a white swelling).



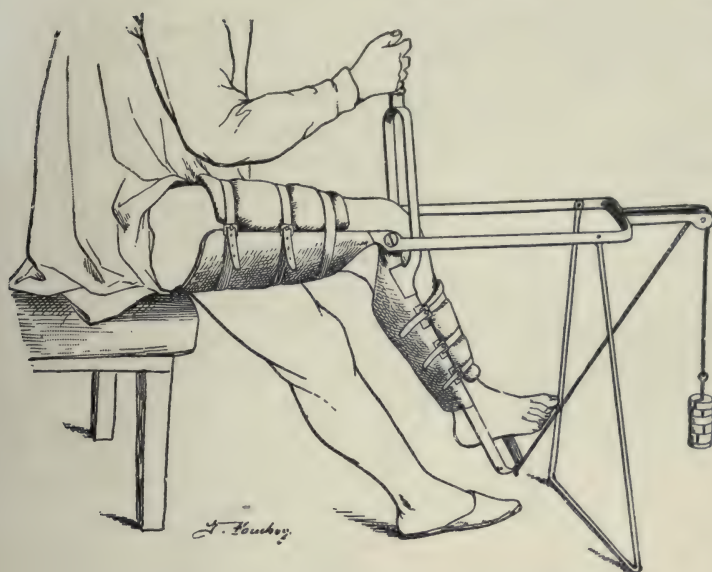


Fig. 540.—Bonnet's apparatus for mobilising the knee.

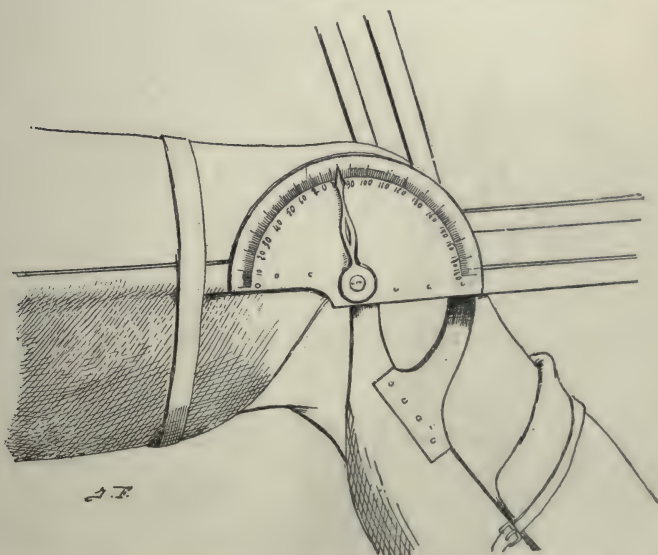


Fig. 541.—View of the knee part of the apparatus (fig. 540).

To obtain ankylosis he is made to wear knee-caps of plaster or of celluloid until the knee, "let loose" for a few days, keeps straight of its own accord, which sometimes requires three or four years or even more. When the knee has been cured for at least a year, and remains in good position, you may leave off the apparatus.



Fig. 542.—A more simple arrangement for mobilisation of the knee.

The knee will be stiff but the result remains, however, very satisfactory.

Especially beware of all forcible mobilisation with or without chloroform.

These forcible mobilisations are the cause, as we have said, of a great many disappointments to practitioners who are not specialists.

Keep entirely to massage, to daily baths—saline or sulphurous—to some attempts at flexion made by the patient in the bath, by the action of the muscles of the leg alone.

At the most, and quite exceptionally, and only a year after the cure is unmistakable, would you allow very gentle, very cautious exercises, made with graduated machines moved by the patient himself,<sup>1</sup> progressing by only a degree or a degree and a half every day (fig. 540 and 542).

And you must always be prepared to stop these exercises at the first sign of inflammation, and in that case, to abandon altogether your attempt at obtaining articular mobility.

Besides, it **very often** happens (in more than a third of the cases), that **movement returns spontaneously**, without any special treatment, a year or two after the cure of a tuberculous arthritis. Every one has seen examples of this, especially in very young subjects.

## II.—*In children and adults in hospital or of the working class.*

After the preceding considerations, need we especially mention that one ought not, in patients of this category, to look for a cure with preservation of movement?

Cure them with the knee stiff. When the knee has remained in a good position a year and a half or two years after the cure has been accomplished, free the patient from all kind of apparatus.

We have observed in our hospital children as well as in private cases, but a little less frequently, that mobility has returned in due course, spontaneously.

### 3rd. **The Clinical Aspect and the Therapeutic Indications.**

We will add just one word to what has been already said concerning **deformities**.

A lateral deformity (**genu valgum** or **subluxation of the tibia outwards and backwards**) nearly always accompanies direct flexion of the tibia (fig. 543, 544).—As to complete

<sup>1</sup> See my *Traité des Tumeurs Blanches*, Masson, p. 220.



luxation of the tibia backwards (fig. 545, 546), into the popliteal space, you will doubtless never see it ; I have seen it only twice in seventeen years.

But we must draw your attention to the **lengthening** of the affected **leg** which is **often** produced in these white swellings,



Fig. 543.—Another type of white swelling. Fig. 544.—Another with genu valgum.

and is due to the greater fertility of the articular cartilages of the affected side than of the sound one.

This fertility is rarely ever stimulated, and **lengthening** occurs only in **benign arthritis** ; it is often compromised **on the contrary**, in **severe white swelling**, and then there is **shortening**.

Lengthening, where it exists, is only temporary ; after one, two or three years, the cartilage of the sound side overtakes the other and the equality of the two legs is re-established.



Fig. 545.—Lucien L., of Paris. Complete luxation of the tibia into the popliteal space, existing about five years (radiogram).

In the meantime, for walking, you would have to provide a thick sole for the sound limb.



Fig. 546.—The same, after reduction, without surgical interference. The reduction was made November 18th, 1905 (under chloroform). With the apparatus shown in fig. 867 and 868, we made traction on the leg up to 70 kilogrammes for 15 minutes, which pulled down the articular surface of the tibia to the level of that of the femur. Then, by pressure downwards, on the femur, and upwards on the tibia we brought the two surfaces into contact. Afterwards, a large plaster (from the umbilicus to the toes). In the plaster we made, the next day, two openings ; one in front, opposite the condyles, the other behind, opposite the tibial tuberosities, and applied thus a double cotton-wool compression (as in our apparatus for Pott's disease), to maintain and further perfect the reduction. Five months later the reduction remained intact.

#### 4th. As to Treatment.

We will add to what has been said in the first chapter, a few words on the apparatus, the correction of vicious positions,

the technique of injections and on surgical operations on the knee.

### A.—The Apparatus

To immobilise the knee satisfactorily, if it be a question of preventing a deformity or maintaining a correction, it is necessary

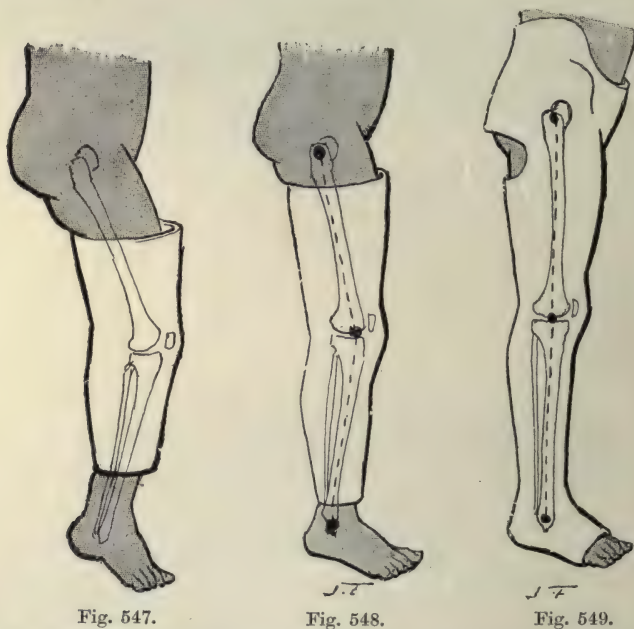


Fig. 547.—The small knee-piece very often made. Much too short and too loose; the soft tissues are pressed in by the edges of the knee-piece and deviation is produced at will.

Fig. 548.—A longer knee-piece, but still defective, for the same reason, only in a lesser degree.

Fig. 549.—The perfect method of immobilising the knee. Our large plaster, which takes in not only the knee, but also the two neighbouring joints.

to make a large plaster, which includes the two adjacent articulations (hip and ankle).

It is sufficient to cast one's eyes on the diagrams above, to see how the classical "knee-piece" is incapable of immobilising the neighbouring joints, in cases ever so little intractable. The



plaster, then, must reach from the waist to the toes, and will be in every way the same as the large apparatus for hip-joint disease (fig. 547 to 549).

When large orthopædic apparatus (celluloid or leather) are used, they may be articulated at the hip and the foot, leaving the knee fixed.

It is only when the tendency to deviation no longer exists that one can dispense with taking in the two neighbouring joints (fig. 550). A medium plaster is then used, reaching from the ischium to the toes, and immobilising only one of the adjacent articulations, or even simply the ordinary knee-piece, which leaves them both free.

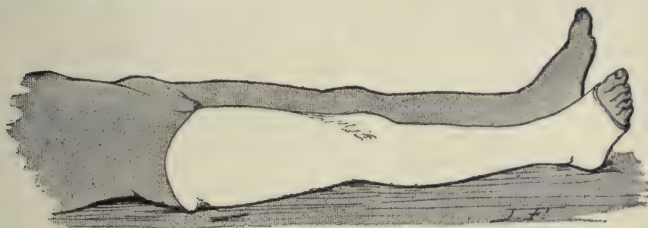


Fig. 550.—The medium apparatus reaching from the ischium to the toes.

Finally, let us say that, to immobilise the knee, circular plasters are better fitting and more accurate than splints, and ought, in consequence, to be preferred.

The large anterior opening of the circular plaster allows of the examination of the knee and of the articular injections being given without difficulty.

#### B.—The Correction of Vicious Position of the Knee-Joint

(a) *Continuous extension* may be of service in private cases where the parents dislike plaster (figs. 552, 553).

When it is a question of deformity at the onset, and you are able to attend to it very closely, you can in this way obtain the correction—with a continuous extension arranged by you and looked to every week.

In a word, it is simpler to straighten than to put on a plaster.

(b) *Forcible straightening of the knee.*—We have only a little to add to what has been said in the *General Remarks*.

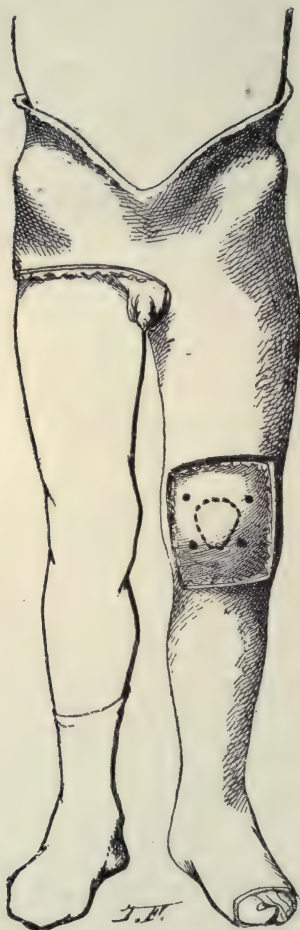


Fig. 551.—Large apparatus with an opening allowing the treatment by puncture and injections.

Take care to make **more traction** on the foot than **direct pressure** on the knee (fig. 554), which might lead to bruising or fracture of the articular extremities.

Traction should be responsible here for three-fourths of the correction of the bad position, and the pressure for less than one-fourth. This applies to the straightening of uncomplicated flexions.

But one must not forget that, generally, there are lateral deviations as well.

Scrutinise thoroughly the different elements of these complex deviations, of which the two most frequent types are : *flexion and genu valgum*, *flexion and sub-luxation* of the tibia outwards and backwards.

You act upon these different factors at the same time. Thus, whilst an assistant makes traction on the foot to correct the flexion, you yourself exert all your strength on the upper extremity of the tibia, in order to correct the sub-luxation, forcing the tibia from behind forwards and from without inwards

with one hand, whilst with the other you push the femur in the opposite direction (fig. 554).

Repeat the movement, persisting for several minutes ; it is necessary to persist, because, if the deviation be of old standing, osseous irregularities exist which render straightening difficult to carry out.



Fig. 552.—Sheep-skin gaiter and stirrup, for continuous extension of the knee in white swelling (see fig. 553).

Complete the correction at two sittings, it is easier for you and better for the patient. In this way you tear nothing. I speak only of the osseous extremities, because injuring the popliteal vessels and nerves is scarcely conceivable, in spite of

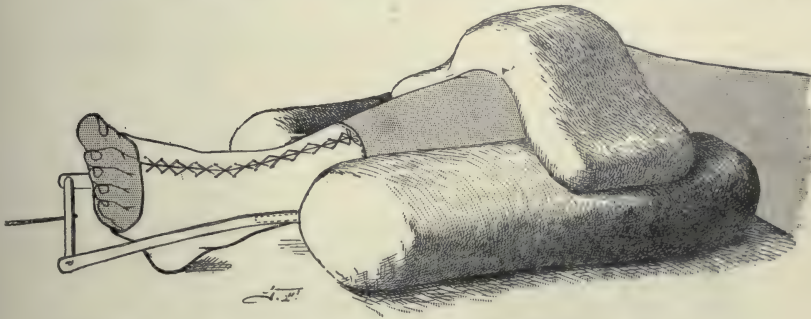


Fig. 553.—A sand-bag is placed on each side of the knee to steady it ; a third sand-bag presses lightly on the patella and adds to the continuous extension, in order to correct the flexion.

what is said in certain books : I have never observed it in my own practice.

**Correction of Ankyloses.**—Do not interfere with ankyloses in good position. Straighten those in bad position, by the method I have just described ; it is always (or nearly always) possible to arrive in this way, under chloroform, at a correction



of very old standing deviations, even those styled **Ankyloses of the Knee.**

When the patient is anæsthetised, if one is careful, one finds some indefinite movements in the joint; but this very slight mobility is sufficient for one to be able to promise the straightening of the knee merely **by manœuvres**, which simplifies matters considerably. Those manœuvres you already know (fig. 554).

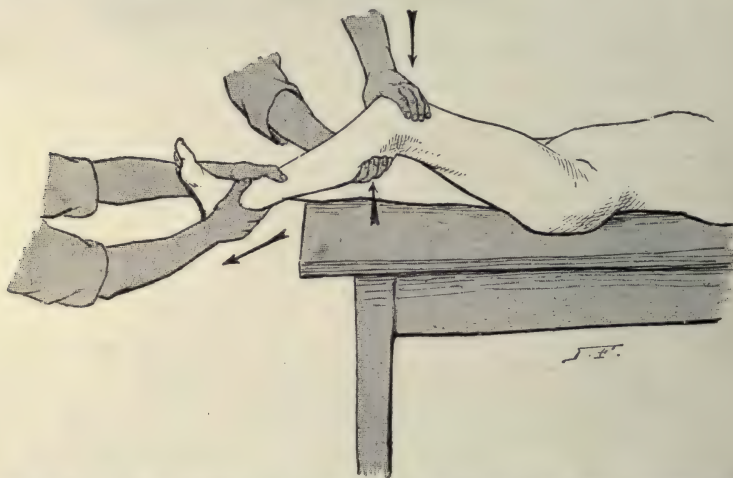


Fig. 554.—Correction of a bad position. An assistant makes strong traction in the direction of the deviation; the surgeon applies moderate pressure on the femur and pushes forwards the upper extremity of the tibia. The patient is held firmly by the armpits, and by means of the sound limb flexed over the abdomen (fig. 439 and 440).

After having, for some minutes, made gentle traction and pressure, you fix with a good plaster apparatus the partial correction obtained, which is sometimes scarcely appreciable. The traction and pressure are kept up whilst the plaster dries, which will effect a gain of several degrees—and so you leave it for 15 or 20 days. After which, a second sitting for straightening, which will give you a much more appreciable correction.

If need be, you make a third correction, and, finally, you

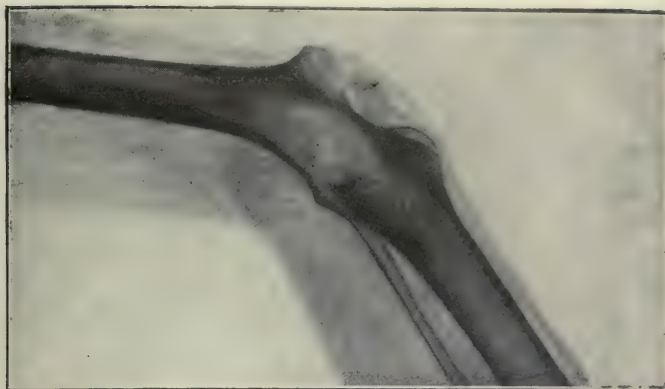


Fig. 555.—Osseous ankylosis, of 21 years' standing, in a woman thirty years of age. Notice the complete fusion of the femur and tibia, so complete that there is a medullary canal in the osseous bridge which unites them. Shortening 19 cm. Walks with crutches. The patient asked to have the leg straightened, **but without an operation.** If impossible to effect this without an osteotomy, she would prefer to retain her infirmity, however inconvenient.

Given this ultimatum, we decided upon performing osteoclasis. For that, we strengthened the femur and tibia with wooden splints, four on the thigh, four on the leg, held in position by straps (see fig. 466); and (under anaesthesia) we applied pressure with all our strength (two of us) so as to increase the flexion of the limb, the femur being held by two assistants. After two or three minutes of effort, the limb gave way with a creaking sound and became flexed at an acute angle, then we brought it back into extension. Large plaster for two months. Constitutional effects very slight.

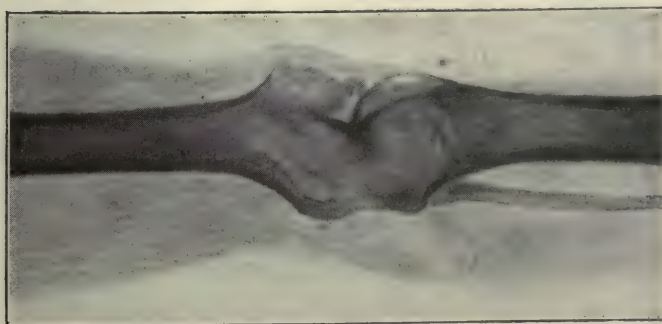


Fig. 556.—The same three months after osteoclasis. We had broken the bone at exactly the spot we wished, opposite the old articulation. One sees the débris of the patella. *The result is perfect.* Instead of 19 cm. of shortening, scarcely a centimetre and a half remained (due to atrophy). We took great care to do nothing to restore mobility to this knee. The lameness has disappeared.

succeed in correcting, without surgical interference, deviations for which some other practitioners might have judged a resection or an osteotomy indispensable.

You can also avoid division of the popliteal tendons, though that operation is really easy with the technique described in Chap. XIII.

(And the same applies to the case, rather rare, of osseous ankylosis. It would be quite easy to perform a supra-condylar osteotomy by the method explained in Chap. X.)

#### C.—The Injections

The culs-de-sac of the knee-joint are so extensive, so superficial, and so accessible that injections here are particularly easy, provided you are not dealing with a chronic white swelling of several years standing, where the cavity is obliterated or beset with adhesions.

Remember that the interline of the joint corresponds with an horizontal passing through the apex, or inferior angle of the patella (fig. 557).

The **apex of the patella** is perfectly appreciable to the finger. On each side of it one easily feels a **depression**. A needle pushed into the depression would penetrate into the knee-joint.

Here already are **two points of access** to the joint.

There are **two others**, at a centimetre and a half **above** the base of the patella, and at a centimetre and a half **outside** (with reference to the axis of the limb), the two superior angles of the bone.



Fig. 557.—Points of access to the knee-joint.



If one punctures there, one penetrates into the sub-tricipital prolongation of the synovial sac.

As a general rule, it is **into the external part of the subtricipital prolongation** that I make the injections, and **I advise you to make them there.**

One can make the cul-de-sac bulge out at this external point by exerting pressure on the other points, that is, above and on the inner side of the patella, and below it, on each side of the patellar ligament.

Plunge your needle into the superior external cul-de-sac, not directly backwards, but a little downwards and inwards, in order that the point enters the inter-condylar notch between the femur and the under surface of the patella. You will feel that the needle is at once enclosed and free between the two bones.

When you have this sensation, you are sure to be in the desired position, exactly in the articular cavity.

If you puncture the skin too near to the patella, or if the obliquity of the needle is too great, you run the risk of striking the base of the patella and missing the cavity. Therefore puncture at a centimetre and a half, or even two centimetres above and outside the supero-external angle of the patella, and give the needle an **inclination of about  $45^{\circ}$ .**

You ought to feel the femur with the point of the needle; but you avoid driving the point into the bony tissue because this might break it, or obstruct it, which would render the passage of the fluid impossible. Consequently, you push



Fig. 558.—Obliquity is given the needle in order to be sure of penetrating into the joint cavity (*idem*, when one penetrates by the supero-external cul-de-sac).

the needle firmly and slowly through the soft tissues up to the femur, and when you have felt the bone, you gently withdraw your needle for a few millimetres; you ought then to feel the point move about between the patella and the femur. At this moment, you should push in the injection without hesitation, and you will see a swelling, not only in the subtricipital cul-de-sac, but also in the inferior lateral cul-de-sac, on each side of the apex of the patella, and you will at the same time see the patella distinctly raised.

*The Injections in Old White Swelling of the Knee.*

In old standing cases, as I have said, it may be that the subtricipital cul-de-sac is obliterated or cut off from the general cavity, and that the patella is adherent to the inter-condylar notch.

In that case, if you would be perfectly sure that you have penetrated the cavity, or rather what remains of it, puncture on each side of the patellar ligament, exactly in the interline; puncture somewhat obliquely, going from the lateral point to the centre in such a way that the end of your needle reaches the inter-condylar notch, exactly behind the patellar ligament.

The liquid introduced at these points cannot take a false route; it will penetrate between the two articular surfaces—when there are interstices between them.

At the same sitting, you should afterwards make a second injection, directly into the subtricipital cul-de-sac, so as to be certain that you have reached the whole of the affected parts.

After the classical treatment of injections thus pushed more or less freely into the cavity, should the patient complain of one or more points being particularly painful, either on the outer side, or above the interline, one may infer that some independent small foci persist, which have not been reached by the injections made into the general cavity.

You should then make a supplementary series of injections

into the painful points, pushing the needle up to the surface of the bone, beneath the periosteum.

#### D.—Some Remarks on Surgical Operations on the Knee-Joint

I will not explain the technique of amputation of the thigh, and will not delay in describing to you all the surgical operations which have been performed, or proposed, for the treatment of white swelling of the knee—*erasion*, *synovectomies*, *arthrectomies*,—and I shall not do so because I consider these economic interventions to be bad operations.

Such operations, which do not reach beyond the limits of the disease, have scarcely any advantage over resection. They have only cured white swelling quite at its onset, where the lesions were almost nil, where treatment by injections or even conservative treatment would have been sufficient. That is to say, they are perfectly useless ; to their uselessness one must add nearly all the disadvantages of major surgical operations : the dangers of *fistulæ*, of tuberculous infection, etc.

The only surgical operation you will sometimes have to perform is **resection of the knee-joint in adult working people** ; this is out of the question in children, where it would be disastrous from the point of view of shortening of the limb.

What you may chiefly have to perform is **drainage of the joint** for articular abscess which has been, by mistake or simply by omission, allowed to open, and, by a second error, has been allowed to become infected.

##### (a) Technique of Drainage of the Knee-Joint

Take care to open the joint cavity at its most dependent points (fig. 559 and 560).

You know that, performed methodically as it ought to be, drainage comprises **four "lateral" incisions, parallel to the axis of the limb**, two on each side—seven or eight centimetres in length.



The two antero-lateral incisions run along the sides of the patella, the two postero-lateral, rather smaller, correspond to the latero-posterior borders of the condyles.

These two last incisions replace posterior drainage directly

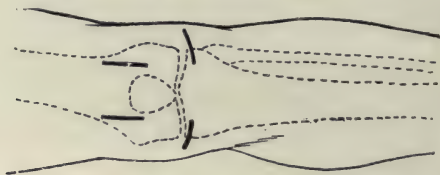


Fig. 559.—Drainage of the knee-joint. For the two upper incisions and the infero-internal incision, follow the indications in the diagram ; but the postero-lateral external incision *ought not to be made* as it is figured, in a direction *perpendicular* to the axis of the limb ; give it a direction *parallel* to that axis, so as to be absolutely sure of avoiding the external popliteal nerve.

through the popliteal space, which is more difficult and could only be done by opening the joint freely and extensively.

Through each of the antero-lateral incisions one inserts a large drainage tube through to the postero-lateral incision.

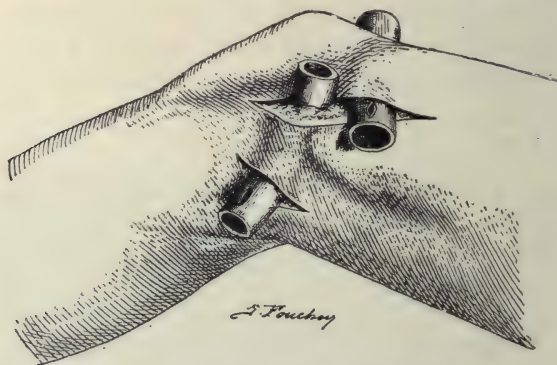


Fig. 560.—Knee-joint viewed on the inner aspect. The different incisions giving passage to drainage tubes which connect the incisions together.

You will foresee that one could, in the same way, join the two antero-lateral incisions by two supplementary drains, the one passing above, the other below, the patella.

The internal postero-lateral incision, made over the posterior

border of the internal condyle, does not require very great accuracy. It is otherwise on the outer side, on account of the presence of the **external popliteal nerve**.

To avoid it with certainty, one must take as a landmark the tendon of the biceps, which is easily recognised (fig. 736); the nerve is a centimetre and a half on the inner side of the tendon. One has therefore only to keep always on the outer side of the tendon and stop the *lower* end of the incision at the

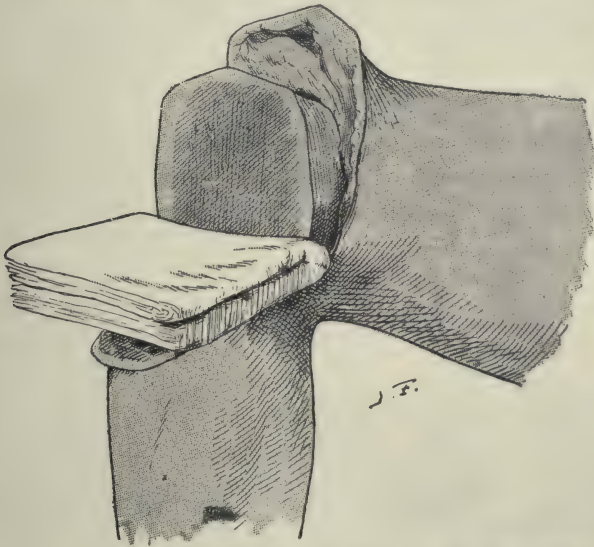


Fig. 561.—Arrest of hæmorrhage after resection. *1st step*: One places between the two bleeding osseous surfaces, a compress folded in several doubles.

articular interline (the interline corresponds to the apex of the patella with the leg in the extended position).

#### (b) On Resection of the Knee-Joint

One will find the technique of resection at length and very well described in Farabeuf's book. Here we will make, on this subject, simply some personal remarks which will complete what you already know.

You will use an Esmarch's bandage, which gives you greater facility for seeing and removing the diseased parts.

You perform the resection of the two articular extremities

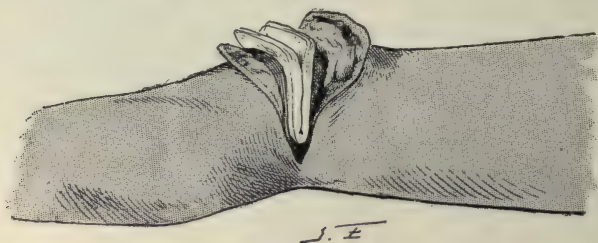


Fig. 562.—*2nd step* : The limb is afterwards placed in the straight position.

with a small saw or a very large chisel—a resection not too radical nor too sparing, so as to remove the whole of the diseased parts of the bones, cutting for a few millimetres—not more—

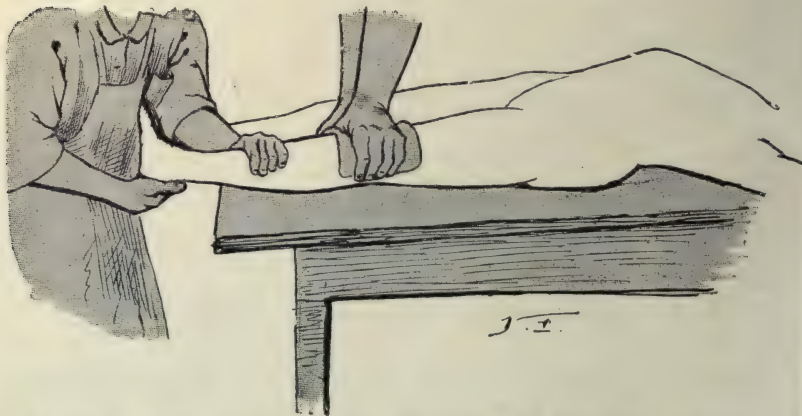


Fig. 563.—*3rd step* : One or two other compresses are placed over the wound ; the surgeon exercises continuous pressure with both hands whilst his assistant supports the foot and presses the limb upwards, with the foot applied to his breast.

into the healthy zone ; then you cut away all the suspicious soft tissue, with scissors and dissecting forceps, expending as much attention and time as may be necessary.



The toilet of the bones and soft parts being completed, the exact adaptation of the surfaces of bone well ascertained, place some compresses between the surfaces of the two bones, the leg being carefully held in the flexed position; you place two other compresses in front of the bones, between the bones and



Fig. 564.

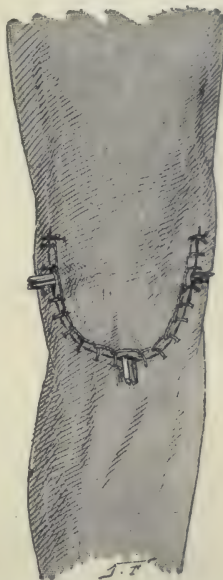


Fig. 565.

Fig. 564.—The method of suturing the skin (overcasting with catgut).

Fig. 565.—Suture completed; at three different points, strips of catgut have been inserted to ensure drainage

the corresponding soft parts, and get ready to apply compression, meanwhile the Esmarch bandage is taken off (fig. 561 to 563).

You **press** very firmly in this way for **ten or twelve minutes**. That suffices to ensure the arrest of hæmorrhage without the application of ligatures. I scarcely ever apply ligatures to the small vessels, and the advantage is great in not leaving any foreign bodies in the wound, so as to be certain of obtaining union by first intention.

If bleeding returns after twelve minutes, keep up the pressure for five or six minutes longer ; it is not time lost.

If, which you rarely see, a vessel bleeds again at this time, it is quite open to you to use a catgut ligature, but you will still gain much by prolonged pressure, seeing that, in place of twenty ligatures, you will have only to apply one.

Hæmorrhage being quite arrested, you pass on to the adaptation of the bones. You will have no occasion to suture the bones, thanks to the large plaster which you apply ; you suture the skin with an overcast stitch of catgut as figured here (fig. 564).

This suture takes a minute : the twelve minutes lost in compression are regained here.

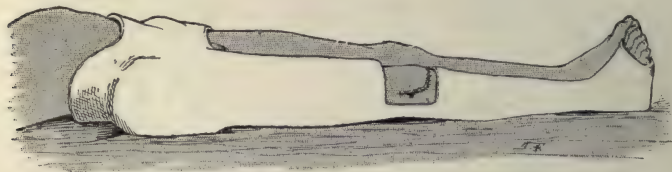


Fig. 566.—Plaster apparatus furnished with an opening which allows of inspection and dressing of the operation wound ; it is closed again after each occasion with a plastered bandage.

Three strands of catgut or three small drainage tubes are inserted, to prevent the accumulation of sero-sanguineous effusion in the wound (fig. 565).

The suture of the skin and the drainage may thus be done with materials which are capable of being entirely absorbed.

The **apparatus** is here of capital importance, and merits the closest attention. It is a large plaster, very well fitting, which reaches from the waist to the foot, as shown here (fig. 566). One commences by making the part of the apparatus which extends from the toes to the root of the limb, modelling it well around the knee and the malleoli ; then, when the setting of the plaster is completed, or thereabouts (after waiting about five or ten minutes), one constructs the abdominal portion.

The patient is placed on the pelvic-support, in order to do this. The junction between the abdominal and leg portions is easy to make, with a few turns of plaster bandage applied as a spica from one to the other, and some strengthening squares

(see p. 416 for the method of construction of the plaster apparatus). When the last bandage has been applied, one models the apparatus very accurately round the pelvis. This precision prevents even the slightest displacement of the two



Fig. 567.—Ordinary stocking or sleeve of jersey, and a lath beneath; for moulding the knee.



Fig. 568.—A celluloid apparatus for walking. The hip and ankle are jointed and movable. The knee is rigid or mobile as desired.

articular surfaces placed in contact with one another; one obtains in this way perfect union, in correct position, without mentioning the advantage which the apparatus has in ensuring arrest of hæmorrhage and the prevention of all inflammation and all pain due to the perfect immobility which it affords.



If, which is very unusual, fever should supervene, there is nothing to prevent one making one or more temporary openings in the plaster opposite the suture, in order to examine the wound and inspect the drainage (fig. 566).

On the fiftieth day, one removes the plaster, replacing it by another, or, still better, by an **orthopædic apparatus** (fig. 567 to 570) with which the patient will be able to walk, after a week's rest, at about the sixtieth day.

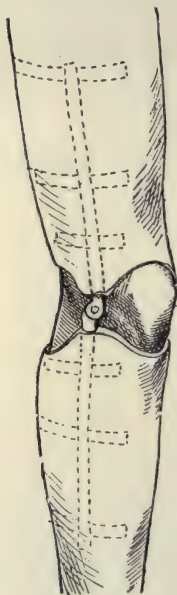


Fig. 569.



Fig. 570.

Fig. 569.—Knee apparatus (in plaster) furnished with a joint. To render this jointed knee apparatus movable, it is sufficient to cut it into two plastered sheaths in the anterior median line and to trim the edges.

Fig. 570.—Knee apparatus in celluloid, serving at most to protect the knee but not sufficient to prevent displacement.

But, if need be, the patient will be able, being provided with the large plaster apparatus we have just described, to get on to his feet ten or fifteen days after the operation and walk with the help of crutches.

**Convalescent Apparatus for White Swelling of the Knee** (see fig. 567 to 570).

From the moment he is placed on his feet, the child is supplied with a large apparatus in celluloid (extending from the waist to the toes), similar to that used in the convalescence of hip-disease—with the difference that in hip-disease one leaves the hip rigid and articulates the knee and foot (of the apparatus), whilst in white swelling of the knee it is the knee (of the apparatus) which is left rigid, the hip and the foot being articulated. But a little later one can articulate the knee in its turn.

In the case of children of the working class who cannot go to the expense of a celluloid, you will apply, also for the period of convalescence, a plaster knee apparatus, reaching from the trochanter to the malleoli (see p. 519).

## WHITE SWELLING OF THE ANKLE-JOINT<sup>1</sup>

### (a) SPECIAL POINTS IN DIAGNOSIS

In adolescents with affections of the ankle-joint, it is necessary to guard against mistaking a simple *tarsalgia* for tuberculous arthritis. It is sufficient to remember this in order to prevent error. The conformation of the foot (the bulging on the inner side of the astragalus and scaphoid, the inclination of the foot outwards in abduction, the sole of the foot generally very flat), the absence of appreciable pulpiness, enable one to make the diagnosis (see also *Tarsalgia*, Chap. XII.).

### (b) PROGNOSIS

It is here particularly favourable: cure is nearly always effected with preservation of movements.

*The functional result to seek for.*

Follow the same general principles as for the knee. They will conduct you to a complete cure.

If, in a very exceptional case, the ankle becomes stiff, do not endeavour to alter this, so long as the position is good. If, however, the ankle has preserved some amount of movement, but

<sup>1</sup> See thesis of Dr. Balencie, 1904.

retains a certain equinism, which makes the patient lame, do not hesitate to place the foot at a right angle and keep it so with a plaster as long as is necessary so as to secure a good position, at the risk of ankylosis occurring.

The play of the neighbouring articulations, the subastragaloid and the mid-tarsal, will supplement, in great measure,



Fig. 571.—Bones of the ankle-joint, posterior view.

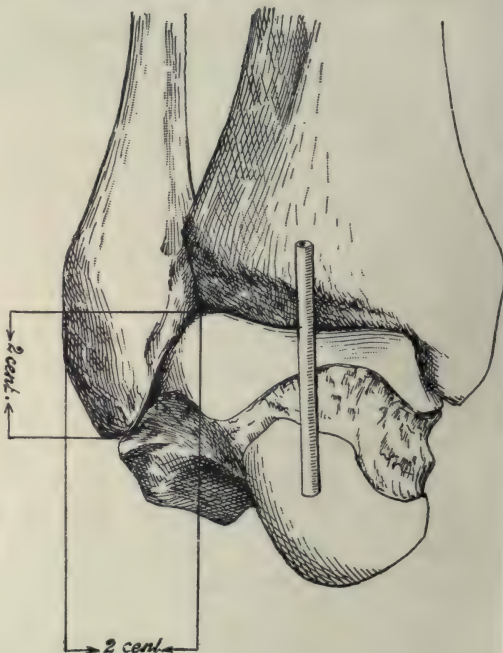


Fig. 572.—The same, anterior view; measurements to find the places of election in the adult.

this stiffness of the ankle, which may, perhaps, be only temporary.

### (c) DETAILS OF THE TREATMENT

#### (1) The Injections

First, some anatomical points on which to base the technique of the injections (fig. 571 to 575).

The synovial cavity of the ankle-joint permits of the needle



entering in front at one of the extremities of the interline, and also behind, at the external part by preference, away from the posterior tibial vessels. In front, one will easily avoid the anterior tibial artery and vein, placed in the middle line on the anterior aspect.

It is necessary to use fine needles (No. 1, or at most, No. 2, of Collin). The internal approach will be wider if the foot is carried outwards, and, inversely, the external approach will be wider if the foot is carried inwards.

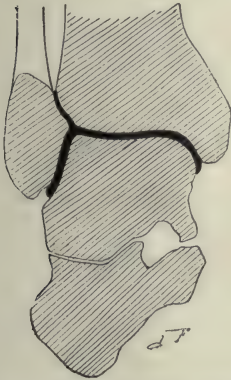


Fig. 573.—Transverse section of the ankle-joint.



Fig. 573a.—One penetrates at the antero-external angle of the tibio-tarsal joint. It is not necessary to introduce the needle so far as is shown here.

As a general rule, I make the injections **in front**, alternately on the inner and outer ends (fig. 574) of the interline (**over the lateral angles**).

But if you find, at your first visit, an appreciable swelling of the serous cavity at another point, it is there, in the centre of the pulpy mass, quite accessible, that you convey the modifying liquid.

It is in front, or almost as frequently in the dependent parts

behind, near to the malleoli, or even close to the tendo Achillis,



Fig. 574.—View of the external aspect of the joint after injection into the synovial cavity.

that these pulpy masses are produced. When they become

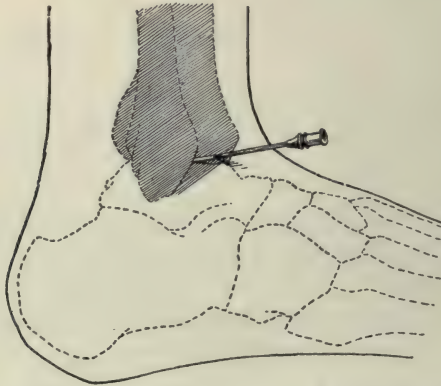


Fig. 575.—One of the two points of election for penetrating the joint.

apparent at the second, third, or fourth injection, the treatment

becomes much easier. The puncture and the injection, if there is fluctuation, are made at these points.



Fig. 576.—Plaster for the ankle: position of the surgeon's hands during the drying of the apparatus.

If at the same time there is an anterior and a posterior swelling, we will choose the latter by preference, because behind, the synovial cavity is much further removed from the skin than in front and we are all the more secure from the risk of producing a fistula. One may see indeed, sometimes, the skin give way in front, after too great distension of the cavity of the joint in the course of treatment by the injections. But it is a simple rupture of the skin through excess of tension, that is, a non-infected fistula. It is sufficient to discontinue the injections and treat the part with good aseptic dressings for a week or two,



Fig. 577.—The same, finished, with an opening opposite the external malleolus.



in order to see it close. One then returns to the injections, if one has not already given the requisite number.

(2) **THE APPARATUS** (fig. 576, 577)

This reaches from the toes up to the interline of the knee, or, at least, well up the calf.

One must take great care to place the foot exactly at a right angle, and even at an angle slightly acute, as a preventive measure, because of the natural tendency of the foot to take on extension; for an analogous reason, in hip-joint disease, we place the thigh, as a preventive measure, in hyper-extension and slight abduction.

Instead of making an opening at the anterior part, through which to make the injection, we prefer to make a bivalve apparatus, anterior and posterior, or lateral, by which means we are able to remove it at each new injection (see fig. 78, p. 86). This also allows of a more complete exploration round the joint.



Fig. 578.—Taking a mould of the ankle (see p. 92). Ordinary stocking cut open to expose the toes. A strip of zinc is placed under the stocking upon the skin.

The puncture and injection being made, and a light dressing applied, one re-encloses the leg and the foot, taking great care to replace the heel very exactly in the most dependent part of the apparatus in such a way as to restore it to a right angle: without this the foot acquires spontaneously a position of equinism. In this way one prevents any deformity.

One uses these bivalves also in cases where there are multiple fistulæ.

### (3) Deviations

If the foot has already become deviated, you should know the way to correct it in the course of the treatment by injections.



Fig. 579.—Mould of the foot with strengthening pieces.



Fig. 580.—Celluloid apparatus with elastic bands for the progressive straightening of the foot.

To do this, you will make, after each injection (or every two sittings), a new small plaster, which takes two minutes (two bandages to roll); before the plaster is set, you endeavour to gain a few degrees of correction by a **gentle but sustained pressure** of your hand applied to the sole of the foot, while the other hand firmly supports the leg portion of the plaster.

As to any deformity observed in a white swelling already

cured, the simplest way to obtain the correction is with a series of plaster apparatus, such as we have described.



Fig. 581.—For the progressive straightening of the foot.



Fig. 582.—Plaster apparatus with a joint.

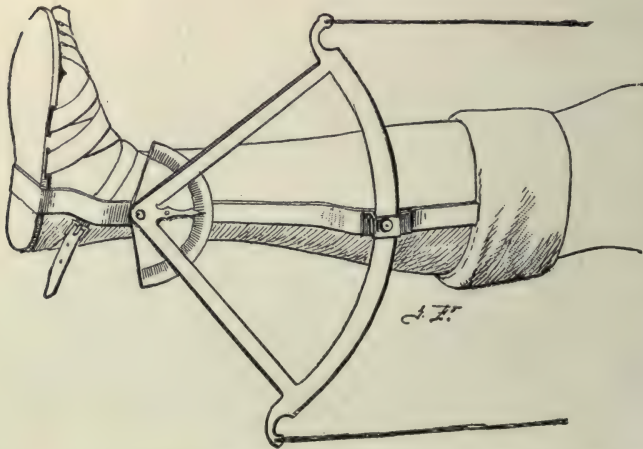


Fig. 583.—Bonnet's apparatus for mobilisation of the ankle. But, if you are not a specialist, **keep it for stiff joints, not tuberculous ones.**

One could use, in place of a plaster, an articulated apparatus



in celluloid or leather, to the anterior part of which might be attached two elastic bands arranged crosswise, to approximate the two articular levers (figs. 580 to 583). One might also correct old standing deformities, particularly the lateral deviations in valgus or varus, with the lever boot which we use for club-foot (see Chap. XXV.). In a general way, do not interfere with ankylosed joints which are in good position.

#### WHITE SWELLING OF THE MEDIO-TARSAL AND SMALL JOINTS OF THE FOOT

Here, also, take care not to mistake a white swelling for a tarsalgia, and conversely. We have mentioned how the diagnosis is made (see also Chap. XII.).

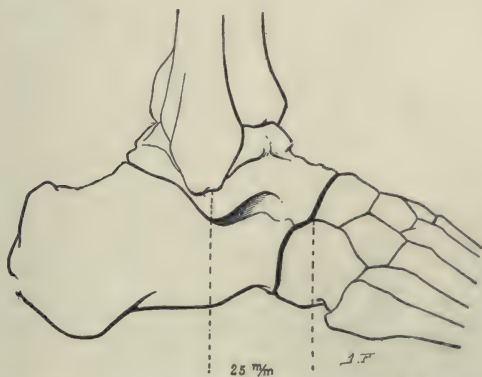


Fig. 584.—Medio-tarsal joint, seen on its external aspect; the point of election is at 25 millimetres in front of the external malleolus (in adults).

One treats a medio-tarsal arthritis like an arthritis of the ankle (see above).

When one is dealing with the small articulations of the foot, it becomes very difficult to push the injection into the joints, they are so compressed together (fig. 584, 585).

On the other hand, one must know that by reason of their superficial situation, almost subcutaneous, the skin on the

dorsal aspect is constantly in danger either from punctures which, in course of time, diminish its resistance or, (from within out) from fungosities. It is necessary then to redouble the precautions to avoid the opening of white swellings of these small joints.

If there is a prominent spot, for example, a pulpy swelling, on the plantar aspect, through which you can reach the joints, make use of it; the effusion which you set up will easily find its way between the bones and the muscular tissues of the sole, and the skin will thus be saved.

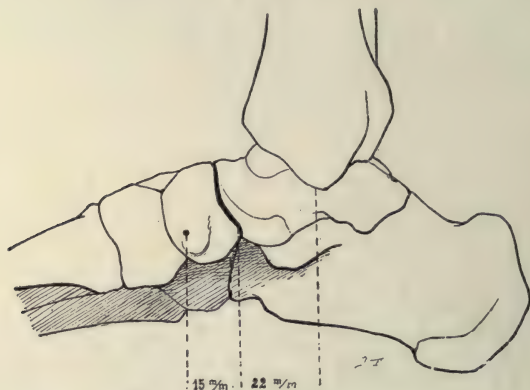


Fig. 585.—The same, viewed on the inner side: the point of election is at 15 millimetres behind the tubercle of the scaphoid; at 22 millimetres from the tip of the internal malleolus.

If it is, on the contrary, towards the dorsal aspect of the foot that the granulations point, especially if they have already commenced to erode the deep surface of the integument, you are then obliged to attack them there. Then, inject with a fine Pravaz needle (puncturing outside the invaded points) a but slightly "irritating" liquid, and in a small dose; inject, for instance, a few drops (6, 8, 10) of creosoted oil with iodoform (rather than camphorated naphthol, which would occasion a too vigorous reaction).

If a liquid effusion is produced causing some degree of tension,

make haste to evacuate it, either by slight pressure made across the skin, after puncturing with a No. 1 or No. 2 needle, or by means of an aspiration in the ordinary way, taking care that you do not use a larger needle than No. 3; No. 4 would here endanger the integrity of the skin.

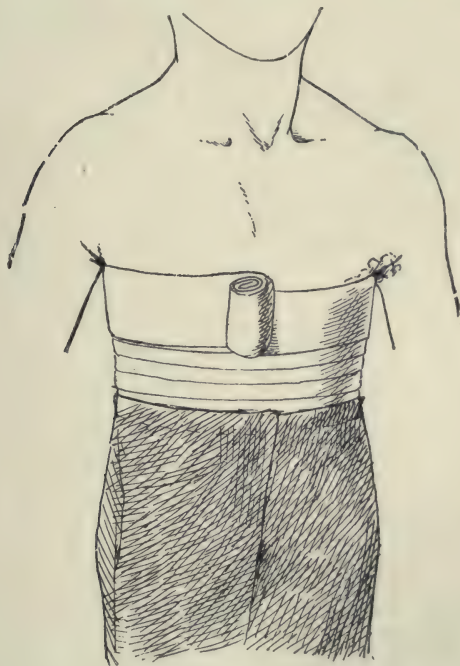


Fig. 586.—How to make a plaster apparatus for the upper limb. *1st step:* Circular turns round the trunk; the plastered bandages are, as in other parts, applied over a vestment which is either an even layer of cotton wool of four or five millimetres thickness or, which is better, an ordinary jersey.

Then reinject a few drops of creosoted oil, and carry on the treatment by combining the two desiderata of preserving the asepsis of the joint and preventing a fistula developing.

Some succeed where others fail. It is a matter of attention and slightly also of skill.

When the skin gives way, if it is not at the beginning, if



one has already been able to make some injections of modifying liquid and to partially sterilise the tissues, little harm is done ; cicatrisation is generally obtained in five days after rupture of the skin, should it occur.

In order to secure healing where the skin has given way, follow the treatment indicated on p. 155.

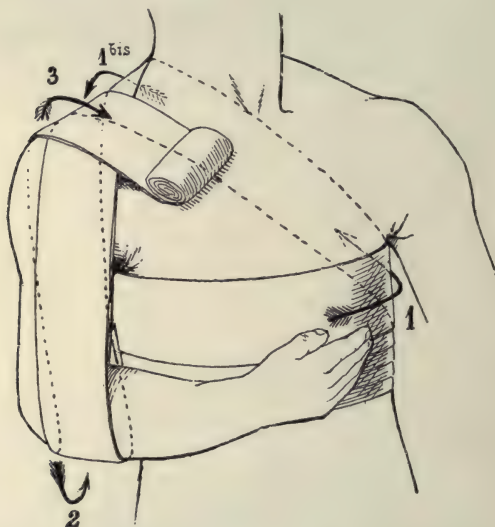


Fig. 587.—How to make a plaster apparatus for the upper limb. *2nd step* : A roller bandage is carried backwards from the axilla of the sound side (1) to the affected shoulder (1 *bis*.); it is then carried down over the anterior surface of the arm making a turn round the flexed elbow (2) ; it passes upwards behind and crosses over the shoulder (3) ; one then makes several turns of the same spica, the different spirals overlapping each other (see the first step in fig. 586).

#### WHITE SWELLINGS IN THE UPPER LIMB

White swellings in the upper limb are less frequent than in the lower limb, because the latter suffers more from hard usage than the former ; they develop to a less serious degree in the arms, and they are cured more easily for the same reason.

It follows, therefore, that the deviations are less marked, and complex apparatus are less often necessary, or are required for a much shorter time, in the upper than in the lower limb.

One may ensure the repose of the arm or the forearm with a simple sling, adding to it, it goes without saying, a slightly

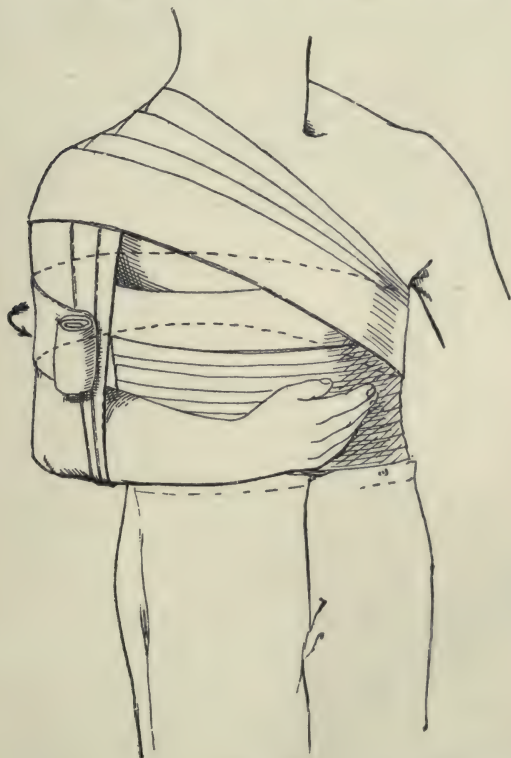


Fig. 588.—The technique of a large plaster for the upper limb (*continued*).  
3rd step: One makes circular turns round the arm.

compressive wool dressing to protect the affected joint. If, however, the pain is very severe or the condition of the swelling somewhat serious, it would be quite simple to immobilise more completely the affected region by replacing the soft strip of wool dressing by a few plastered strips.

It is here that movable plasters or bivalve plasters are chiefly employed; we have given (p. 86) the method of constructing them.

With the plaster apparatus—which abolishes pain at once—the patient is at liberty to walk about.

The diagrams here given represent the different apparatus which you may apply, according to the case, to the upper limb.

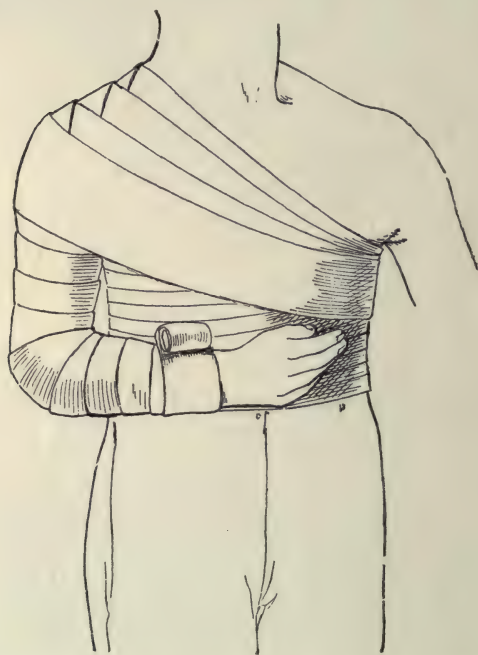


Fig. 589.—Apparatus for the arm (*continued*). *4th step*: One finishes by circular turns round the arm, the forearm and the wrist.

This is the large plaster which secures the immobilisation of the entire limb, in the case of painful white swelling of the shoulder (fig. 586 to 590).

The large apparatus for white swelling of the elbow is identical with the preceding.



Fig. 591 represents the medium plaster for the elbow. One sees by these diagrams the position in which the upper limb is immobilised :

The arm, in an abduction of from  $15^{\circ}$  to  $20^{\circ}$  ;

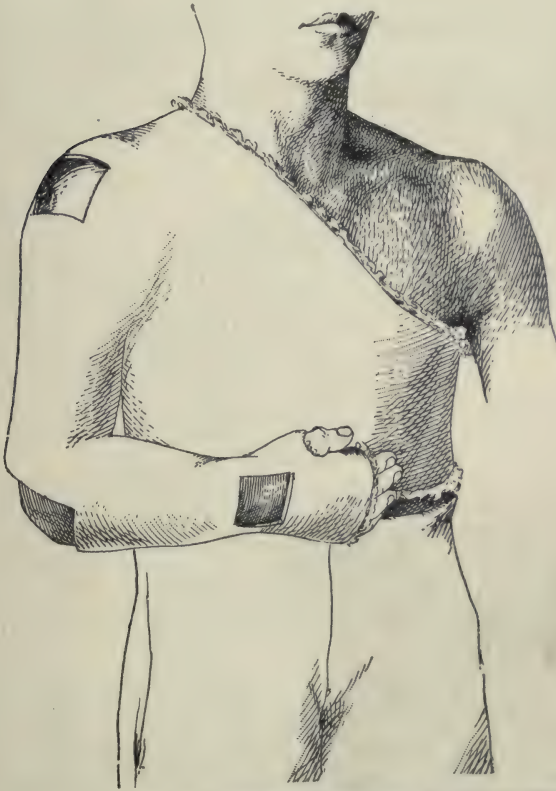


Fig. 590.—Apparatus for the upper limb completed, furnished with openings opposite the different articulations.

The elbow in the position of flexion at a right angle or, better, at an angle of  $70^{\circ}$  to  $80^{\circ}$  (with the arm).

The wrist, in a straight position, without flexion, but without hyper-extension.

## A.—WHITE SWELLING OF THE SHOULDER

**Technique of the injections.**—Fig. 593 shows the anatomy of the joint and the extent of the synovial membrane.

There are several points by which one can reach it. Keep only to the two following :—

1st. **On the outer side**, by the bicipital cul-de-sac of the general cavity of the joint ;

2nd. **In front, between the coracoid process and the bicipital groove.**



Fig. 591.—Medium apparatus for the upper limb immobilising the elbow and the wrist (one can easily make it a bivalve).

It is the second route, that is, **the anterior route**, which I advise you to **follow in all cases**<sup>1</sup> (fig. 593). The pointed coracoid process is always easy to feel, even in fleshy subjects (fig. 595), at the antero-internal part of the bony vault of the shoulder. From the well-defined point of the **coracoid process**, go horizontally **outwards** :

To half a centimetre of the process, in a child ;

To one centimetre in an adult ; and push in your needle at

<sup>1</sup> Because it is rather difficult to make the liquid penetrate the bicipital cul-de-sac.

this point, from before backwards and a little ( $15^{\circ}$ ) upwards. You feel the head of the humerus with the extremity of the needle, and it will be easy, on manipulating the humerus, to assure yourself that you are well upon the head of the bone.

That done, you withdraw the needle for one or two millimetres and then push in your injection.

If you inject every day, you will find some fluid collected by the third or fourth day.



Fig. 592.—One punctures at one centimetre outside the coracoid process.

One should know that it accumulates at the posterior part especially, or in the most dependent part of the joint, rather than in front.

It is therefore in the back part of the shoulder (or even at the posterior part of the axilla), that, from the third or fourth day, you will find fluctuation, although you have made your injections in front.

When fluctuation is appreciable at some point, you puncture



there. But if you prefer to puncture only in front, you can cause the whole of the fluid to move towards this point by pressing with the flat hand over the opposite dependent part of the collection in the joint.

One makes the necessary ten punctures and injections ; after



Fig. 593.—Shoulder joint after injection of the synovial cavity. The sketch shows the different points by which one can reach it with the needle.

which, one empties the articular cavity to the bottom, by two supplementary punctures, without the consecutive injections. During this treatment, as well as after it, one supports the shoulder merely with a Velpeau bandage, which covers the dressing, and with a sling, which supports the arm.

It is only in **acutely painful cases** that one would apply the **large apparatus** (in the way already indicated) with an opening over the anterior part of the region through which to make the necessary injections. But this plaster apparatus must be removed immediately the pain has disappeared, which may be 15 or 20 days after the cessation of the injections.



Fig. 594.—The needle can be forced between the acromial vault and the head of the humerus.

One does not therefore ever make a strict and prolonged immobilisation of the joint.

The advantage of this course is, that the movements of the joint have not time to be lost, at least completely, and that they return generally in the first few weeks which follow the end of active treatment.

They return spontaneously. The patient, when he no longer suffers, instinctively extends the field of movement of the shoulder. A little later, he makes use of his arm for slight purposes, without actually imposing hard work upon it, for several months more.

To aid the return of mobility, one orders the patient daily baths: the baths of Barèges, of Argelès-Gazost, of Bourbonne, etc., etc.

The treatment of fistulæ presents nothing you do not already know after having read the first part of this chapter.

### **As to function. Stiffness and Ankylosis.**

We have stated that if the arm has not been strictly immo-

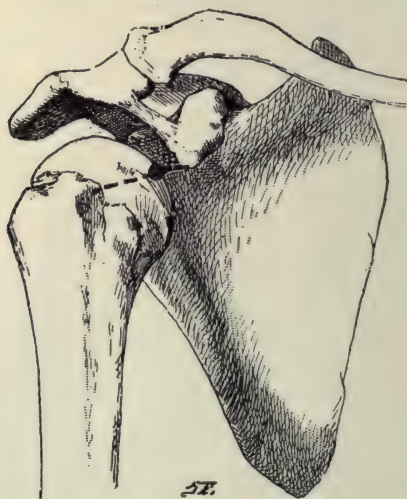


Fig. 595.—The point of election for the injections is found at one centimetre outside the coracoid process, which is always easily felt.

bilised beyond a few months—and this will not be so by the treatment with articular injections—the movements will not, as a rule, be lost.

If you find yourself in the presence of a complete ankylosis, do not interfere with it; it is safer to leave it alone.



Your patient is well cured, thanks to the supplementary and compensatory mobility of the scapula ; and you would run too much risk of aggravating the situation, instead of improving it, by undertaking the forcible mobilisation of the ankylosis.



Fig. 596.—Method of fixing the shoulder.

It is especially the business of specialist surgeons, working in orthopædic institutions, to undertake, in certain cases, these attempts at mobilisation (fig. 596).

#### B.—WHITE SWELLING OF THE ELBOW

In the elbow, as in the knee, the technique of the injections is particularly easy. One enters, either by the radio-humeral interline, which one feels over the external border of the elbow—making movements of rotation in the forearm—or, by preference, a few millimetres **above the tip of the olecranon**, because the route is here wider and more accessible (fig. 597 to 599).

In flexing the forearm to a right angle, one easily feels the tip of the olecranon, and above it the tendon of the triceps stretched in this position. It is sufficient to puncture at 3 or 4 millimetres above the bony point, and outside of the middle of the tendon, to penetrate easily and surely into the joint cavity.

After a few injections, the supra-olecranon cul-de-sac becomes distended, and the technique becomes still more easy. The synovial cavity is placed so far from the skin that one here runs no risk of fistula.

**Bad Positions.**—The elbow ought to be at an angle of

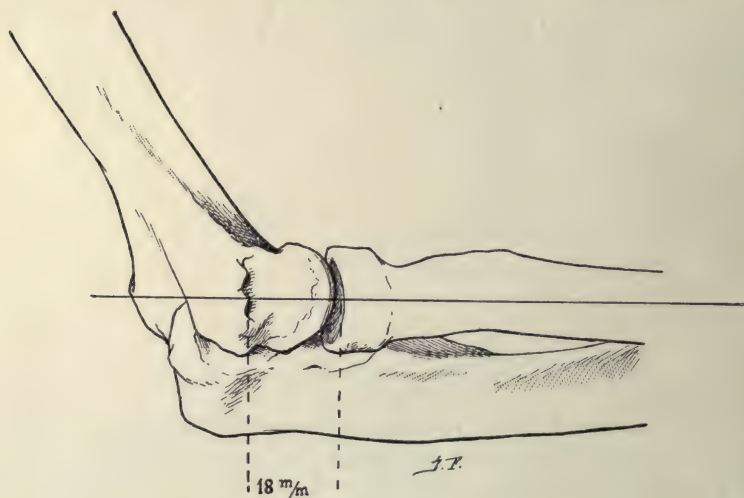


Fig. 597.—The elbow joint seen on its external aspect : the radio-humeral articulation is found at 18 millimetres from the tip of the external tuberosity.

from  $70^{\circ}$  to  $80^{\circ}$ , in the case where, in spite of every care, ankylosis has occurred (see fig. 591).

If it is not in that position, one must place it there, by stages, making partial corrections followed by the application of small plasters, recommencing every eight or fifteen days with a new correction.

**Stiffness or Ankylosis.**—The movements nearly always

return spontaneously, provided that one has not unwisely prolonged immobilisation in a plaster apparatus. That is why we generally keep up fixation simply with soft bandages. Leave



Fig. 598.—The needle strikes the articulation by the supero-external angle of the olecranon and penetrates into the joint's cavity.

the movements to return of their own accord—helping them, after five or six months of waiting, by baths, or by slight gently passive movements, made by the patient himself, in this way :

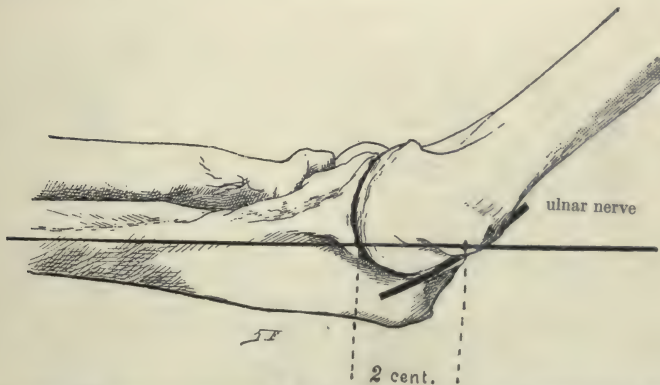


Fig. 599.—The elbow-joint seen on its internal aspect : the ulno-humeral inter-line is found in the axis of the ulna, at two centimetres from the epitrochlea.

The arm is held by two straps or by some person's hand, on the surface of a table, the patient being seated. With the sound hand, he grasps his restrained forearm and imparts slight



movements in every direction: flexion and extension, pronation and supination. In this way we have obtained some very excellent cures (see also fig. 601).



Fig. 600.—Injection into the elbow-joint.

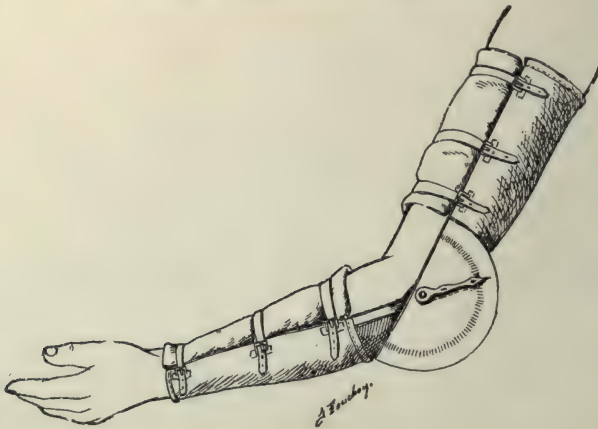


Fig. 601.—Jointed dial apparatus for mobilisation of the elbow. To effect flexion, one can couple the two levers with elastic cords.

What we are now about to describe relates exclusively to incomplete or fibrous ankyloses.

In the case of a patient coming to you with a complete osseous ankylosis, do not interfere with it if the position is good, that is, if the elbow is flexed at an angle of from  $70^{\circ}$  to  $80^{\circ}$ .

If the position is bad (the elbow in complete extension), correct it by an incomplete osteotomy, making use of artificial fracture, or, equally well, keep exclusively to manual osteoclasis, which you may perform in the following manner:—

Some wooden splints are placed round about the arm, and others round the forearm. Whilst the arm is firmly supported, you grasp the forearm with both hands and carry it in the direction of flexion. Separation takes place at the interline.

The forearm thus flexed at a right angle, you fix it in that position with a plaster which you leave on for two or three weeks; after that, you take off the plaster and order baths and massage.

As a rule, ankylosis is reproduced, but in a much better position. Sometimes you may be fortunate enough to see useful movement return.

A resection might, exceptionally, enable you to restore some amount of movement—but how rarely!—and scarcely ever without prejudice to the strength of the arm—so that, everything considered, I dare not advise you to have recourse to that operation—provided that the elbow is ankylosed at a right angle.

### C.—WHITE SWELLING OF THE WRIST AND OF THE SMALL ARTICULATIONS OF THE HAND

#### 1st. White Swelling of the Wrist.

**Anatomy.**—The two extremities of the interline are easily felt. The centre of the interline, in the adult, is found at from 6 to 7 millimetres above a straight line connecting the two apophyses (fig. 602). With this direction you will know how to introduce a fine needle into the interline.

Very often, you will perceive on the dorsal aspect of the

hand some pulpy prominences, developed in the culs-de-sac of the synovial membrane. It is by means of these prolongations of the synovial membrane that you will be able to force your liquid into the cavity (fig. 603).

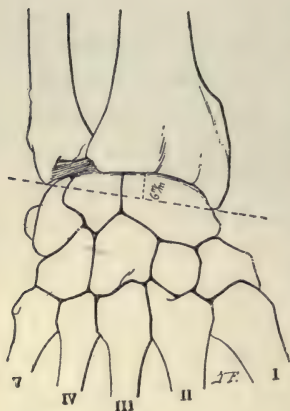


Fig. 602.—The point of election for injection into the radio-carpal joint is found at 6 millimetres above the centre of a line connecting the extremities of the styloid processes of the ulna and radius.

Remember that the soft parts are rather thin on the dorsal aspect of the wrist, and that one ought, consequently, to take every precaution in dealing with the skin. We refer you to what we have already said on this subject with regard to the ankle, where the situation is identical.

**Ankylosis of the Wrist.**—Here, again, the best treatment for ankylosis is the preventive treatment. If you treat the white swelling by means of injections, without plaster, the wrist will not become ankylosed. I have never seen ankylosis of this joint since I have treated white swelling in this way.

But a patient, treated elsewhere, may come to you with an ankylosis already established. If it be fibrous, you will treat it by simple methods: massage, baths; and you will leave the patient himself to carry out with his sound hand some gentle movements (five or six sittings daily of ten minutes each), the forearm being immobilised on the table by another person, or by means of a strap.

If the ankylosis is osseous, leave it alone.<sup>1</sup>

<sup>1</sup> Nevertheless, it has happened to me to interfere personally in a case of complete ankylosis in a young lady from Rotterdam, where, by a non-surgical operation (under chloroform) I broke down the osseous adhesions. I saw the movements return completely, thanks, I ought to say, to a continuous treatment of several months; a treatment very gentle and very



### 2nd. White Swelling of the Hand and Fingers.

One sees, at fig. 602, the situation of the interline of the medio-carpal articulation.

Swellings here ought to be attacked by injections in small doses, at intervals, made each time at a different place, and in such a way as to keep the skin whole whilst attacking the lesions.

Thinking always of the integrity of the skin, it is in this way that one ought to treat **spina ventosa**. I mention this in passing, though it does not enter into our present study, since it is, at any rate at its onset, a disease of the diaphyses of the



Fig. 603.—Point of penetration of the needle. But one does not need to force the needle so far as is represented here.

phalanges rather than of their joints (see *Spina Ventosa*, Chap. XIX.).

Ankyloses of the fingers are treated like those of the wrist (see above). Do not interfere with osseous ankyloses.<sup>1</sup>

### CONVALESCENCE AFTER WHITE SWELLING

Read again what we have said about the convalescence of hip-disease, which is merely a white swelling of the hip-joint (see Chap. VI.).

methodical, carried out by a skilful and well-informed masseur, my regretted friend, Dr. Fourriere.

<sup>1</sup> Here again, nevertheless, I have obtained a complete result in a child from Paris who had an osseous ankylosis of two phalanges of the thumb. Four months after the forcible breaking down of the ankylosis, a good result was obtained, thanks again to Dr. Fourriere.

By what signs can one recognise that a white swelling is cured? By there being no pulpy prominences appreciable, and there being no longer any pain.

The disappearance of pain on pressure is the clinical criterion of cure.

From this time, reckon again from 5 to 6 months as a minimum before thinking of the anatomical cure. After these 5 or 6 months leave the joint to itself to recover its normal functions, by freeing it of all apparatus without walking exercise, unless you wish for ankylosis, in which case you will keep on



Fig. 604.—White swelling of the wrist. Deformity of the dorsal region.

the apparatus for a long time. But it is necessary to seek for ankylosis in all cases where preservation of movements gives rise to persistent pain or allows a deformity to be reproduced.

We repeat that, when it is a question of choosing between a good position and mobility, it is the latter which must be sacrificed.

To sum up, as to white swellings of the lower extremity :

Do not place your patient **on his feet until** the tuberculosis is cured, that is, **until there is no pain** (for six months).

You will not **discontinue** the **apparatus** entirely **until** a **good position** is **preserved** naturally.

### Duties of the Practitioner during Convalescence.

Your rôle is not finished yet. It is, for more than a year, quite as important as it was during the active period of the disease.

But, alas ! there are practitioners who take no more interest in the patient when the pain or pulpiness of the articular region has disappeared.

They do not know that they have still a double duty to fulfil.

**1st duty.**—The practitioner ought to return the patient to his ordinary life gradually, in order to avoid a relapse, or, more exactly, a revival of the disease. In order to do that he must watch over the general condition of the patient and the state of the joint.

**2nd duty.**—He ought to watch over the functional result obtained ; to prevent the good result being compromised or lesened, and, on the other hand, to help on its improvement, by all the means in his power.

### 1st duty.—To prevent a Relapse or a Recurrence.

—We can only repeat here what we have said with regard to hip-joint disease. One ought to take, for a much longer time, precautions of the general and local order. I mean by **precautions of the general order** that one must not hasten the return of the cured patient to the city, or to the surroundings, often unhealthy, where he was taken ill. It is necessary also to attend to his diet and his hygiene and to avoid all possible contagion.

**As to local precautions :** one cannot at once impose upon a joint which has just recovered, the same work that one would upon a joint which has always been sound. It is only gradually that its natural functions will return.

One realises that the upright position, or walking, if it is a question of the lower limbs, can only be tolerated at the beginning for a few minutes.

In certain cases, it is necessary to help the weak joint by



enclosing it in an apparatus, plaster or celluloid, which will ensure its rest. The support of two sticks is useful for walking, and for six months one may even use crutches, which relieve the knee or the foot of the weight of the body. Such are the means of preventing the return of the disease, or, at least, of rendering a return as rare as possible; for a debilitating disease, appearing unfortunately soon after the cure, an eruptive fever, broncho-pneumonia, etc., or, again, a traumatism, a sprain or a blow on the joint, might re-kindle the tuberculous focus, whatever has been done so far. The parents should fly from all foci of contagion, and religiously guard the child from all chances of injury and from all fatigue.

**2nd duty.—To Maintain and Improve the Functional Result.**—Take care, nevertheless, of all unseasonable zeal.

Adhere to the simple methods: massage, baths, teaching to walk.

At the same time, do not have recourse even to those simple methods until from six to ten months at least after the real cure of the white swelling.







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